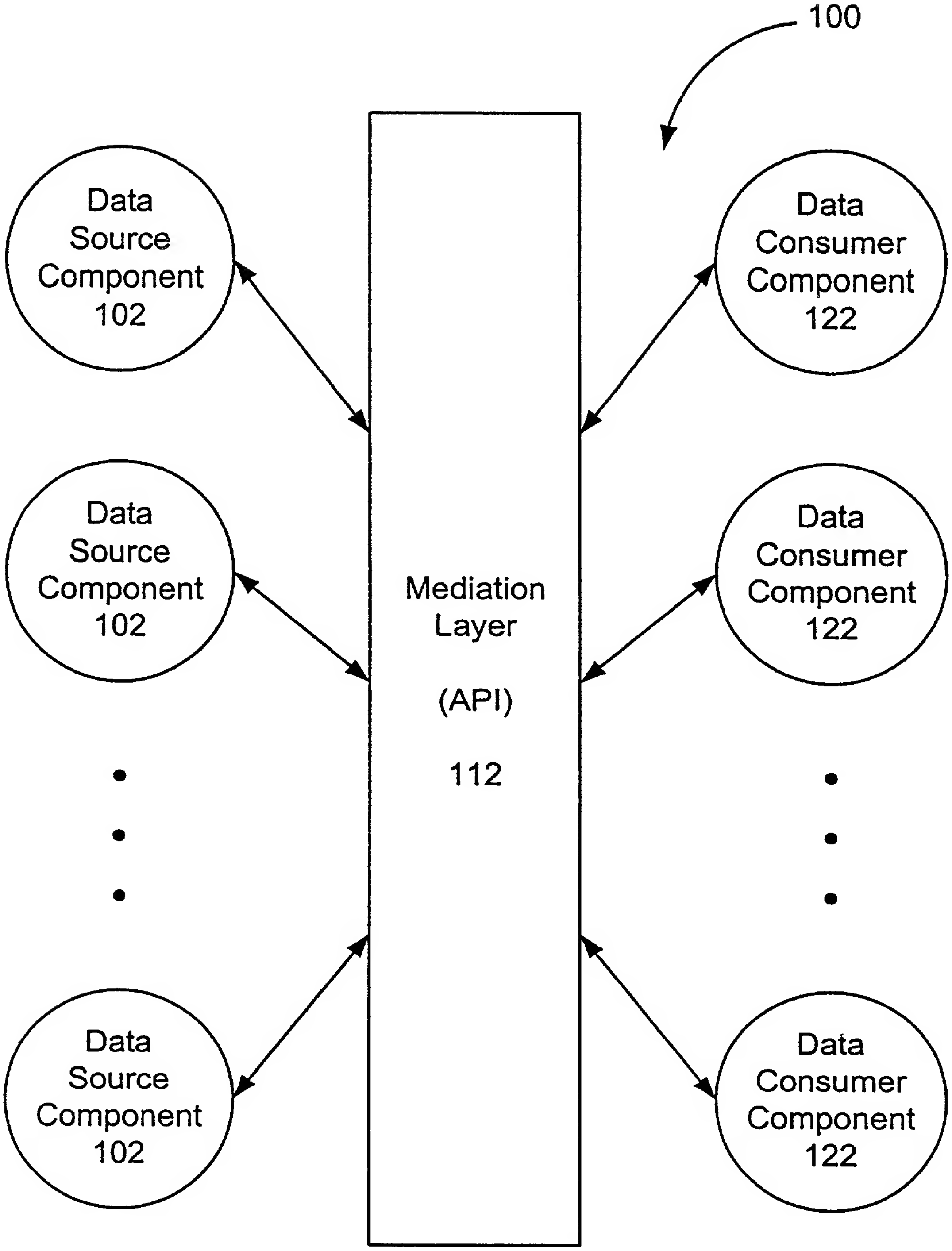

100
Data Source Component 102
Data Source Component 102
Data Source Component 102
Mediation Layer (API) 112
Data Consumer Component 122
Data Consumer Component 122
Data Consumer Component 122

FIG. I

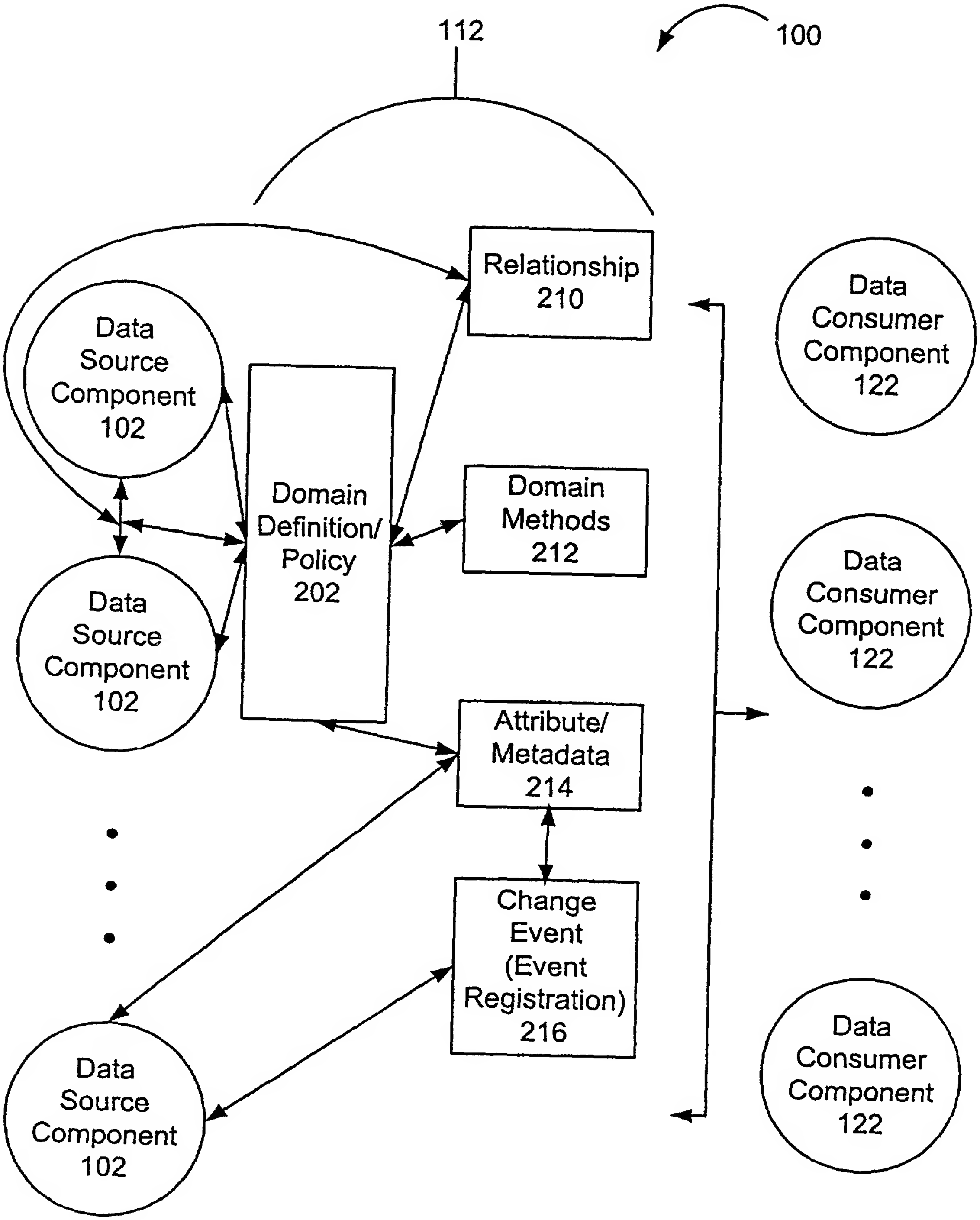

112
100
Relationship 210
Data Source Component 102
Domain Definition/ Policy 202
Domain Methods 212
Data Source Component 102
Attribute/ Metadata 214
Change Event (Event Registration) 216
Data Source Component 102
Data Consumer Component 122
Data Consumer Component 122
Data Consumer Component 122

FIG. 2

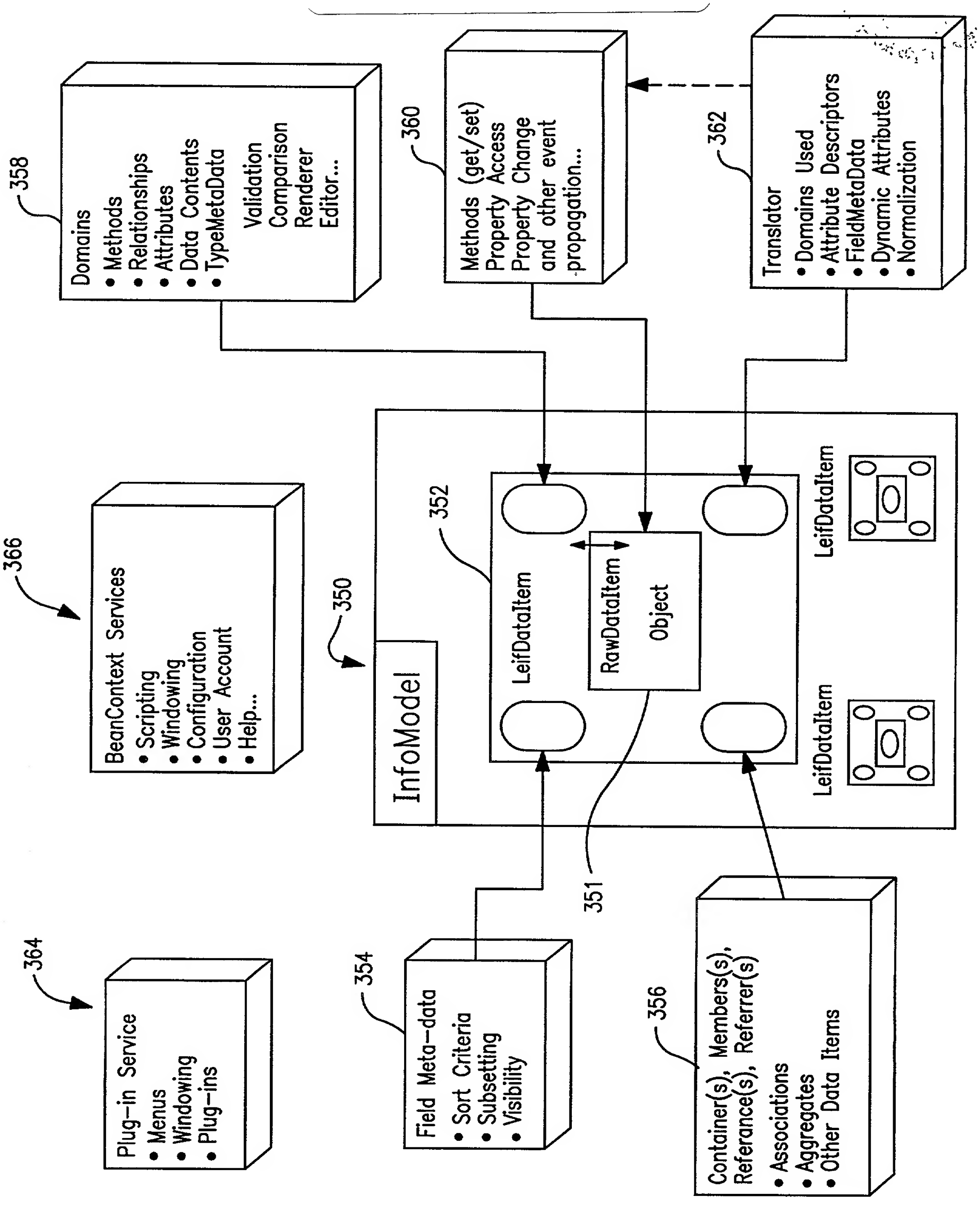

358
Domains
• Methods
• Relationships
• Attributes
• Data Contents
• TypeMetaData
Validation
Comparison
Renderer
Editor...
360
Methods (get/set)
Property Access
Property Change
and other event
propagation...
362
Translator
• Domains Used
• Attribute Descriptors
• FieldMetaData
• Dynamic Attributes
• Normalization
366
BeanContext Services
• Scripting
• Windowing
• Configuration
• User Account
• Help...
350
InfoModel
352
LeifDataItem
RawDataItem
Object
LeifDataItem
LeifDataItem
351
364
Plug-in Service
• Menus
• Windowing
• Plug-ins
354
Field Meta-data
• Sort Criteria
• Subsetting
• Visibility
356
Container(s), Members(s),
Referance(s), Referrer(s)
• Associations
• Aggregates
• Other Data Items

FIG. 3A

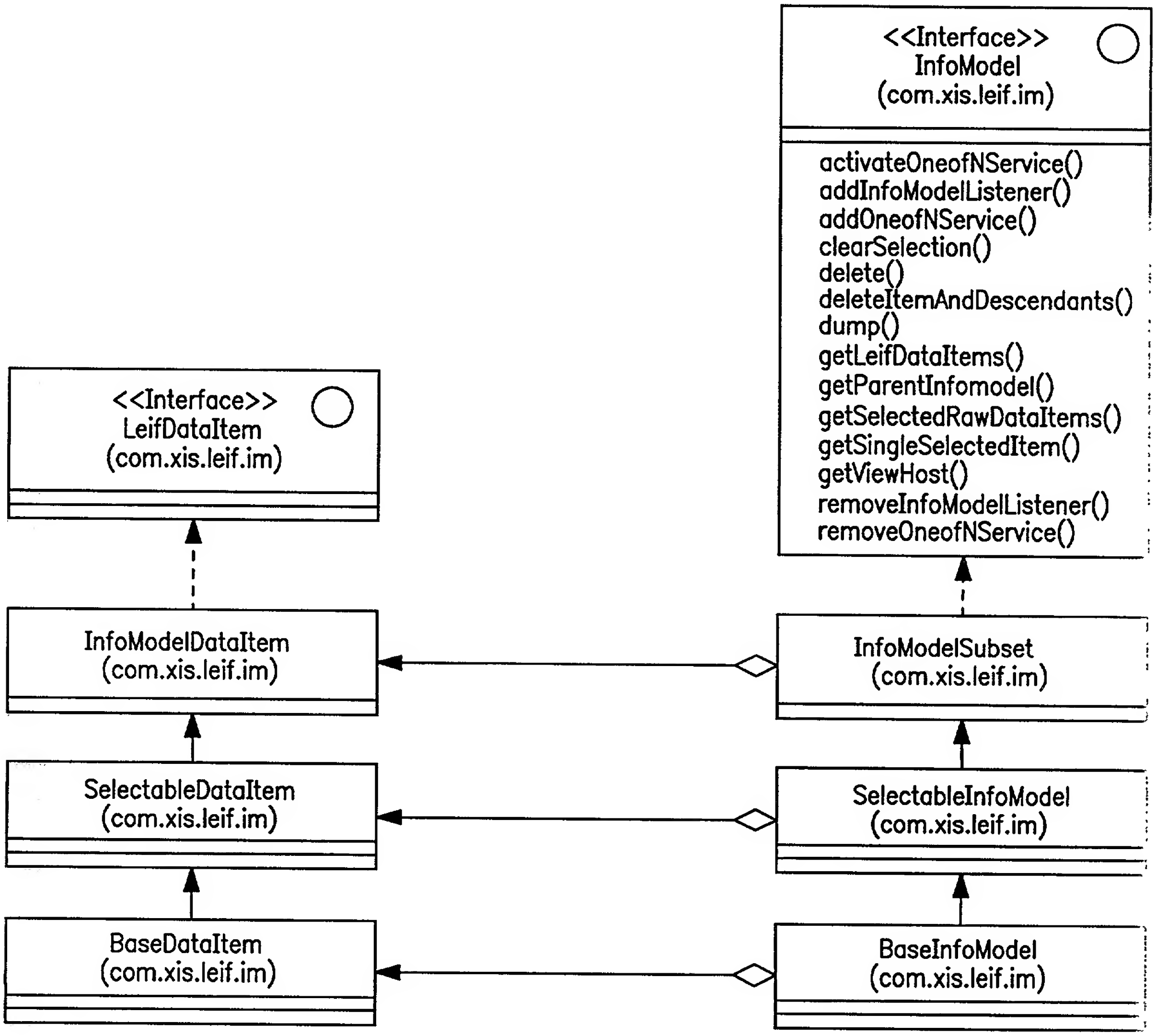

<<Interface>>
InfoModel
(com.xis.leif.im)
activateOneofNService()
addInfoModelListener()
addOneofNService()
clearSelection()
delete()
deleteItemAndDescendants()
dump()
getLeifDataItems()
getParentInfomodel()
getSelectedRawDataItems()
getSingleSelectedItem()
getViewHost()
removeInfoModelListener()
removeOneofNService()
<<Interface>>
LeifDataItem
(com.xis.leif.im)
InfoModelDataItem
(com.xis.leif.im)
InfoModelSubset
(com.xis.leif.im)
SelectableDataItem
(com.xis.leif.im)
SelectableInfoModel
(com.xis.leif.im)
BaseDataItem
(com.xis.leif.im)
BaseInfoModel
(com.xis.leif.im)

FIG. 3B

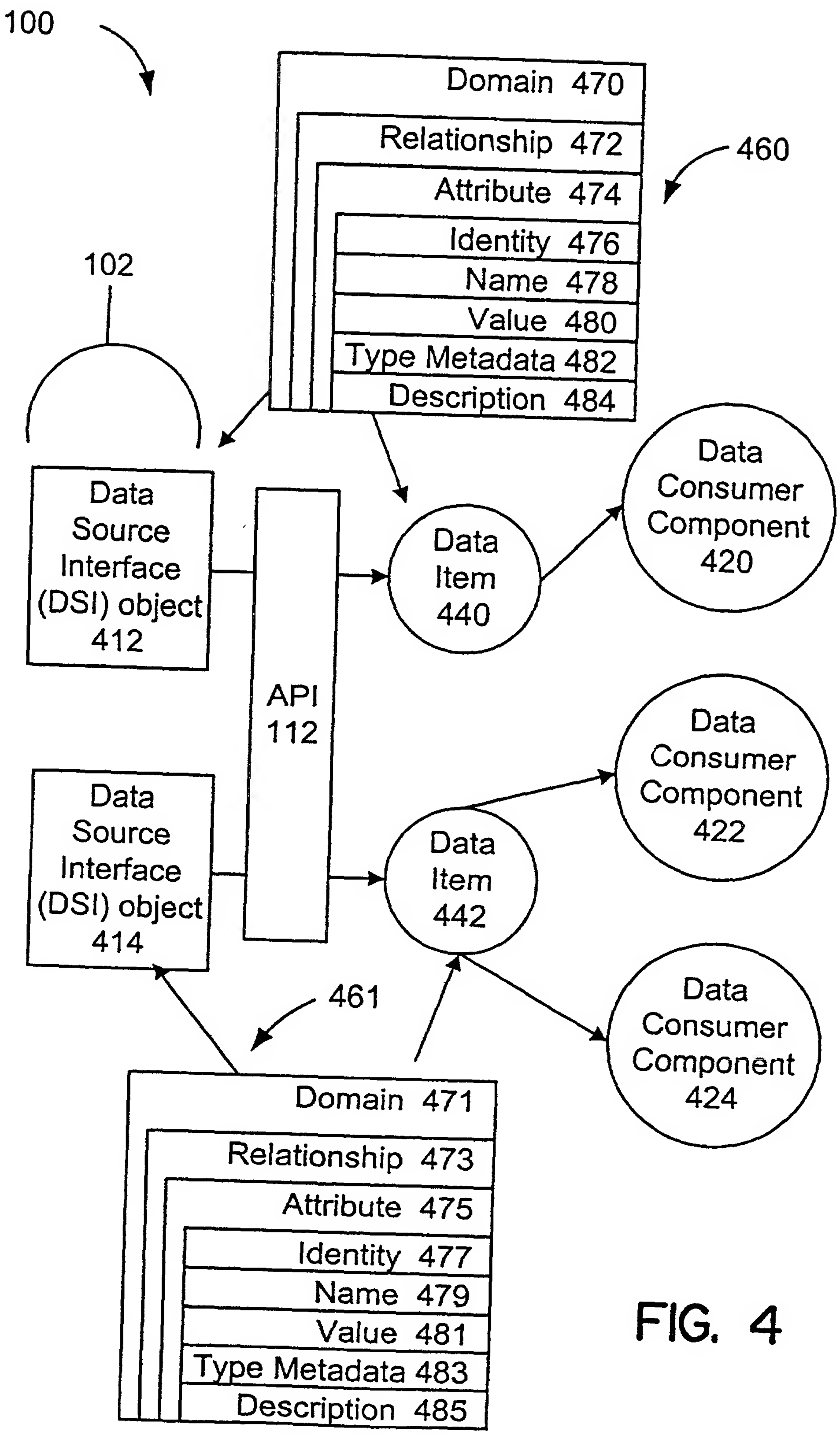
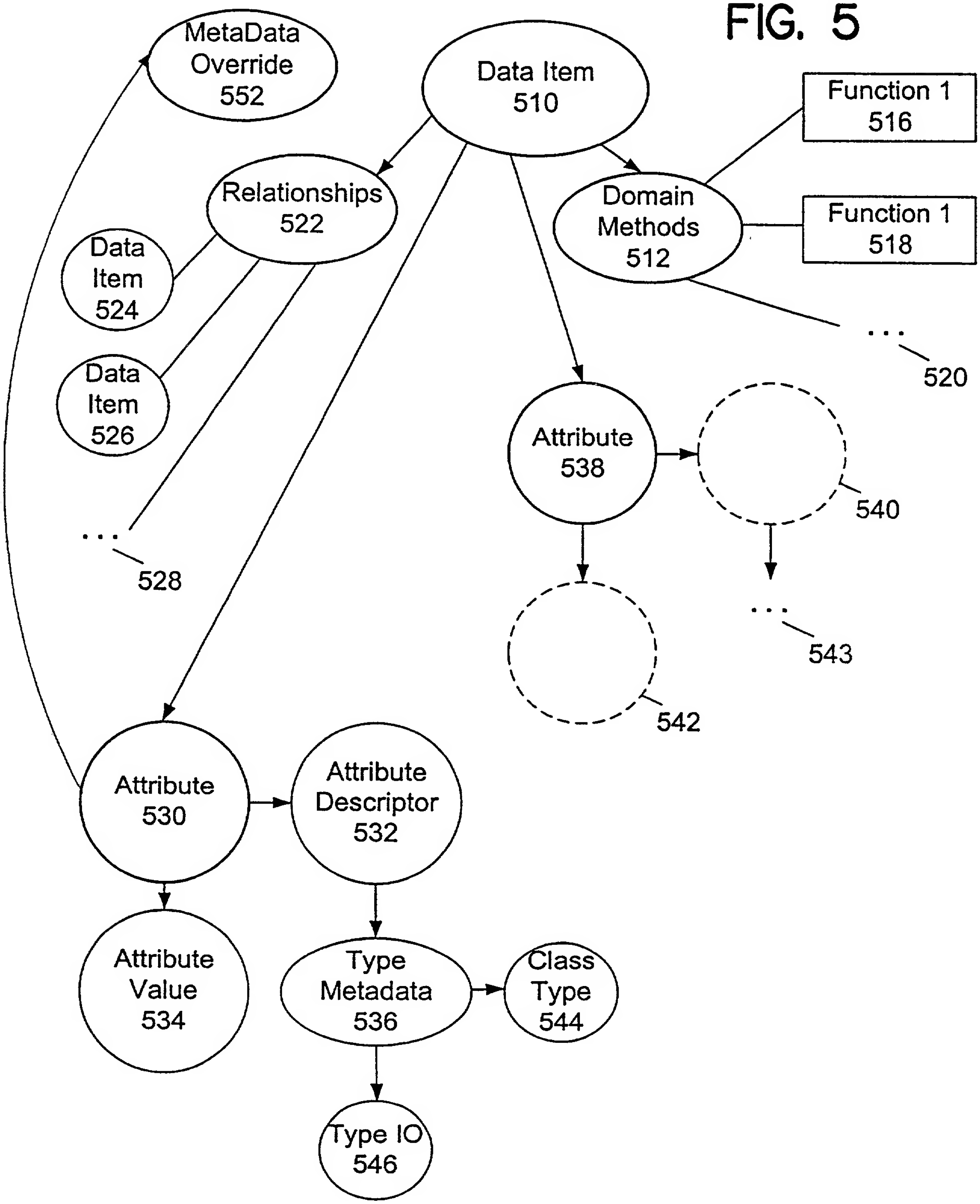
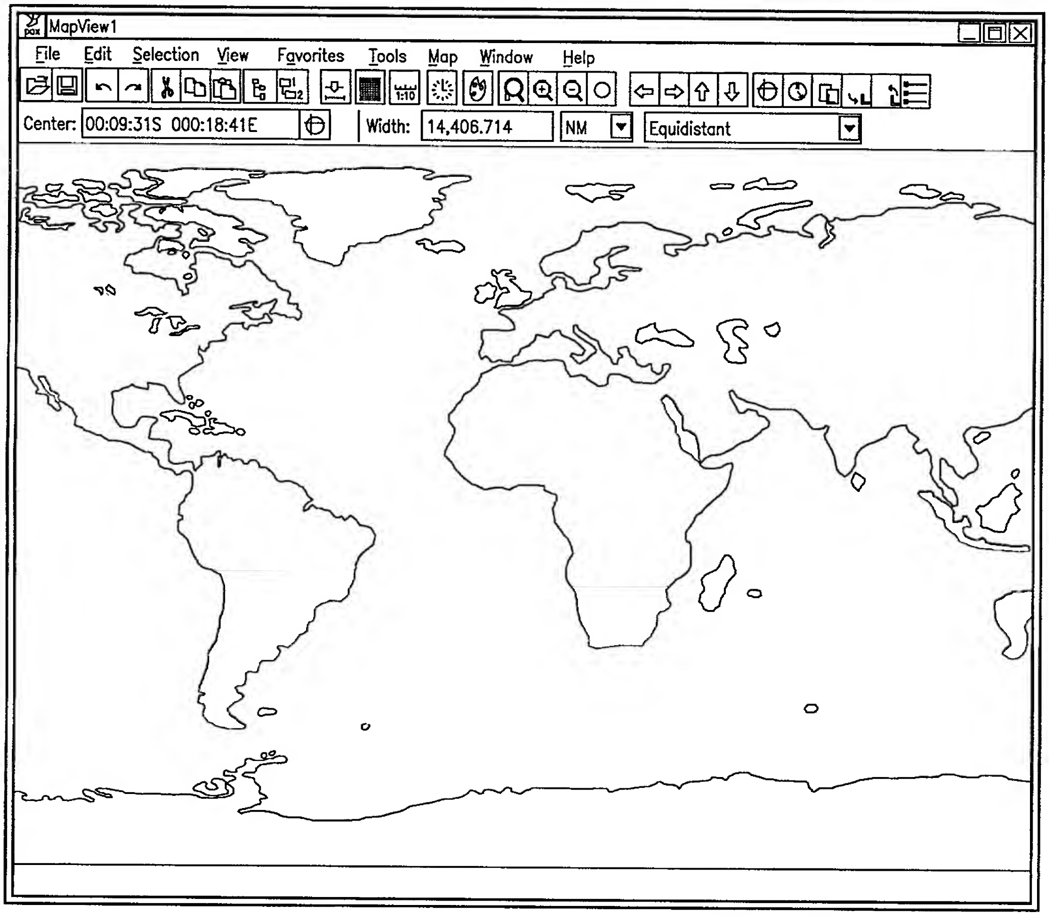

100
Domain 470
Relationship 472
Attribute 474
Identity 476
Name 478
Value 480
Type Metadata 482
Description 484
460
102
Data Source Interface (DSI) object 412
API 112
Data Item 440
Data Consumer Component 420
Data Consumer Component 422
Data Source Interface (DSI) object 414
Data Item 442
461
Data Consumer Component 424
Domain 471
Relationship 473
Attribute 475
Identity 477
Name 479
Value 481
Type Metadata 483
Description 485

FIG. 4

FIG. 5


MetaData Override 552
Data Item 510
Function 1 516
Relationships 522
Domain Methods 512
Function 1 518
Data Item 524
Data Item 526
...
520
...
528
Attribute 538
540
542
...
543
Attribute 530
Attribute Descriptor 532
Attribute Value 534
Type Metadata 536
Class Type 544
Type IO 546



Center: 00:09:31S 000:18:41E

Width: 14,406.714 NM

Equidistant

FIG. 6A

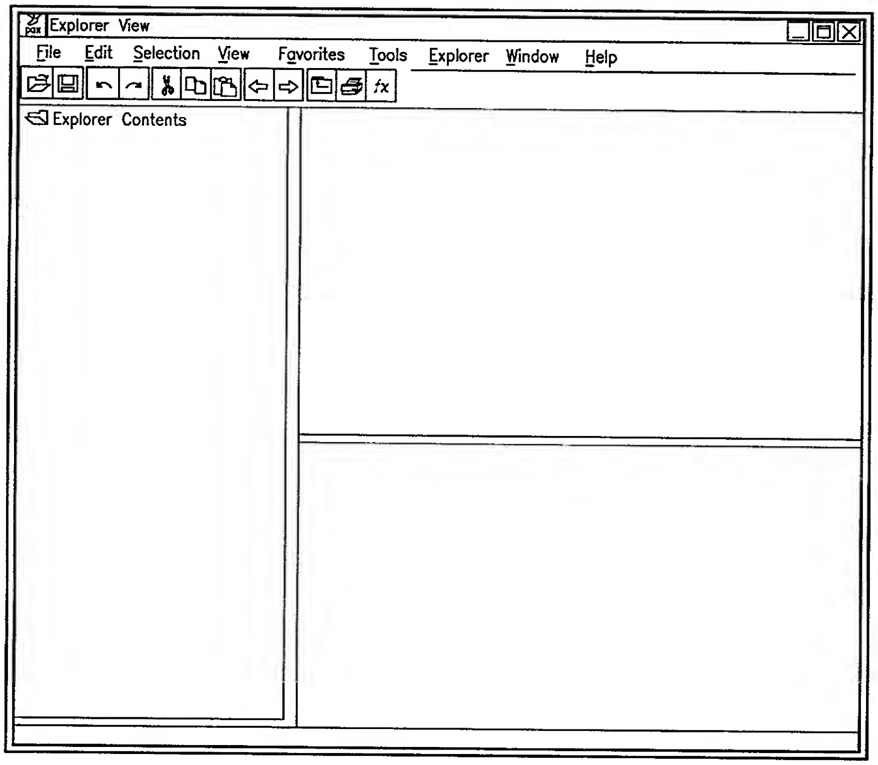
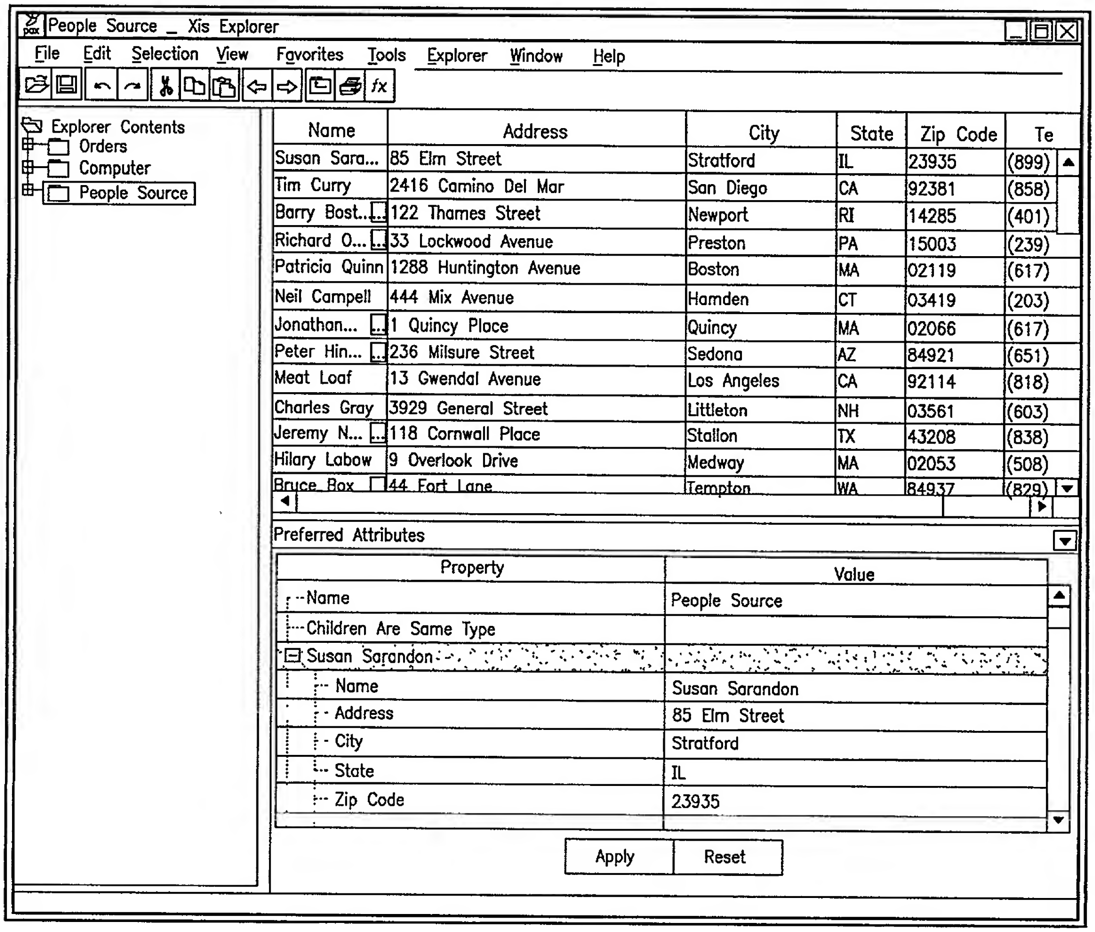

pax
Explorer View
File
Edit
Selection
View
Favorites
Tools
Explorer
Window
Help
fx
Explorer Contents

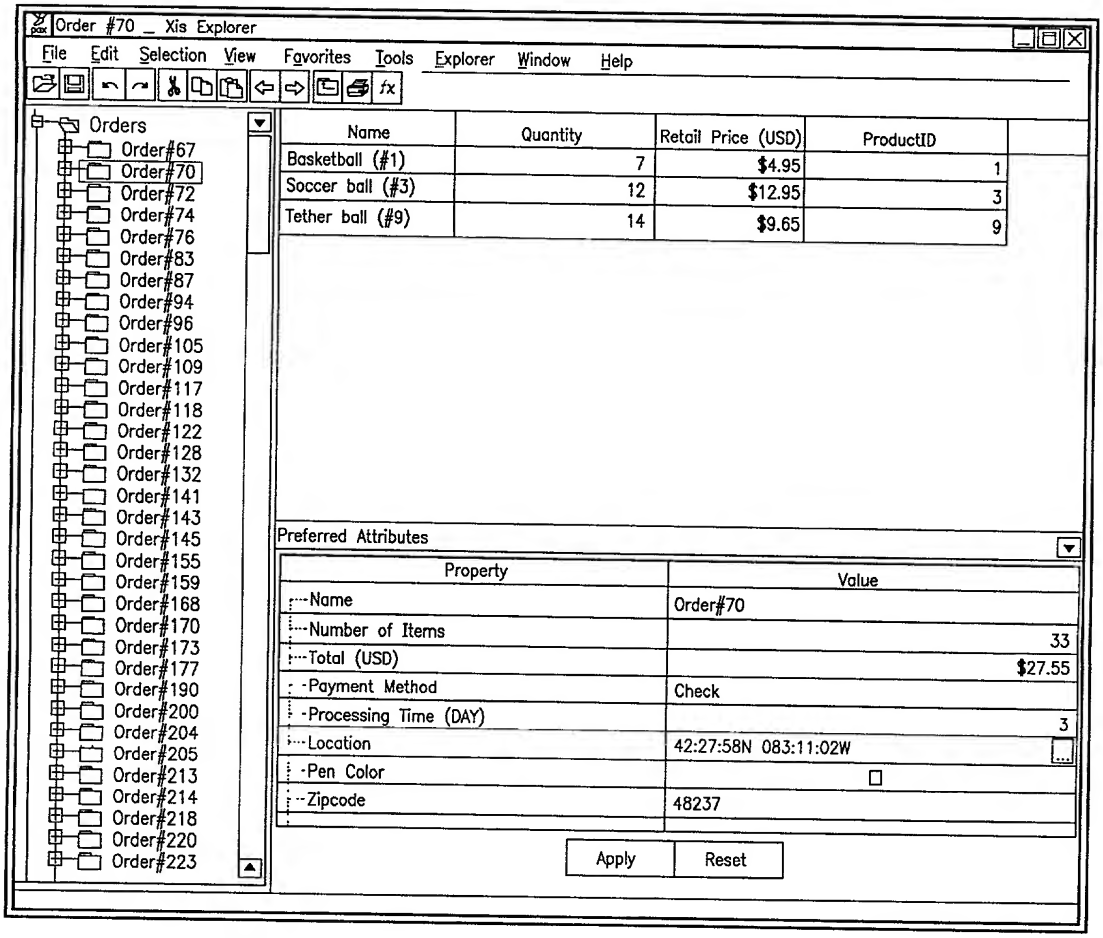
FIG. 6B


People Source _ Xis Explorer
File Edit Selection View Favorites Tools Explorer Window Help
fx
Explorer Contents
Orders
Computer
People Source
Preferred Attributes
Apply
Reset

| Name | Address | City | State | Zip Code | Te |
|---|---|---|---|---|---|
| Susan Sara... | 85 Elm Street | Stratford | IL | 23935 | (899) |
| Tim Curry | 2416 Camino Del Mar | San Diego | CA | 92381 | (858) |
| Barry Bost... | 122 Thames Street | Newport | RI | 14285 | (401) |
| Richard O... | 33 Lockwood Avenue | Preston | PA | 15003 | (239) |
| Patricia Quinn | 1288 Huntington Avenue | Boston | MA | 02119 | (617) |
| Neil Campell | 444 Mix Avenue | Hamden | CT | 03419 | (203) |
| Jonathan... | 1 Quincy Place | Quincy | MA | 02066 | (617) |
| Peter Hin... | 236 Milsure Street | Sedona | AZ | 84921 | (651) |
| Meat Loaf | 13 Gwendal Avenue | Los Angeles | CA | 92114 | (818) |
| Charles Gray | 3929 General Street | Littleton | NH | 03561 | (603) |
| Jeremy N... | 118 Cornwall Place | Stallon | TX | 43208 | (838) |
| Hilary Labow | 9 Overlook Drive | Medway | MA | 02053 | (508) |
| Bruce Box | 44 Fort Lane | Tempton | WA | 84937 | (829) |

| Property | Value |
|---|---|
| Name | People Source |
| Children Are Same Type | |
| ⊟ Susan Sarandon | |
| Name | Susan Sarandon |
| Address | 85 Elm Street |
| City | Stratford |
| State | IL |
| Zip Code | 23935 |

FIG. 6C



| Name | Quantity | Retail Price (USD) | ProductID |
|---|---|---|---|
| Basketball (#1) | 7 | $4.95 | 1 |
| Soccer ball (#3) | 12 | $12.95 | 3 |
| Tether ball (#9) | 14 | $9.65 | 9 |

Preferred Attributes

| Property | Value |
|---|---|
| Name | Order#70 |
| Number of Items | 33 |
| Total (USD) | $27.55 |
| Payment Method | Check |
| Processing Time (DAY) | 3 |
| Location | 42:27:58N 083:11:02W |
| Pen Color | □ |
| Zipcode | 48237 |

FIG. 6D

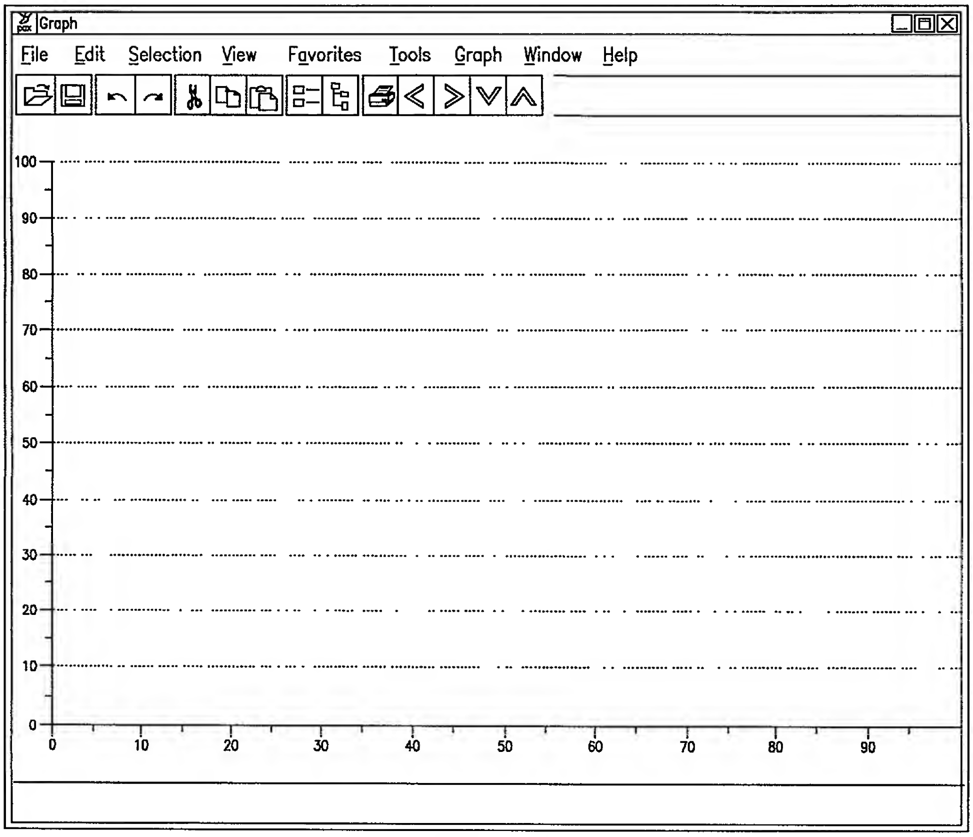

Graph
File Edit Selection View Favorites Tools Graph Window Help
100
90
80
70
60
50
40
30
20
10
0
0 10 20 30 40 50 60 70 80 90

FIG. 6E

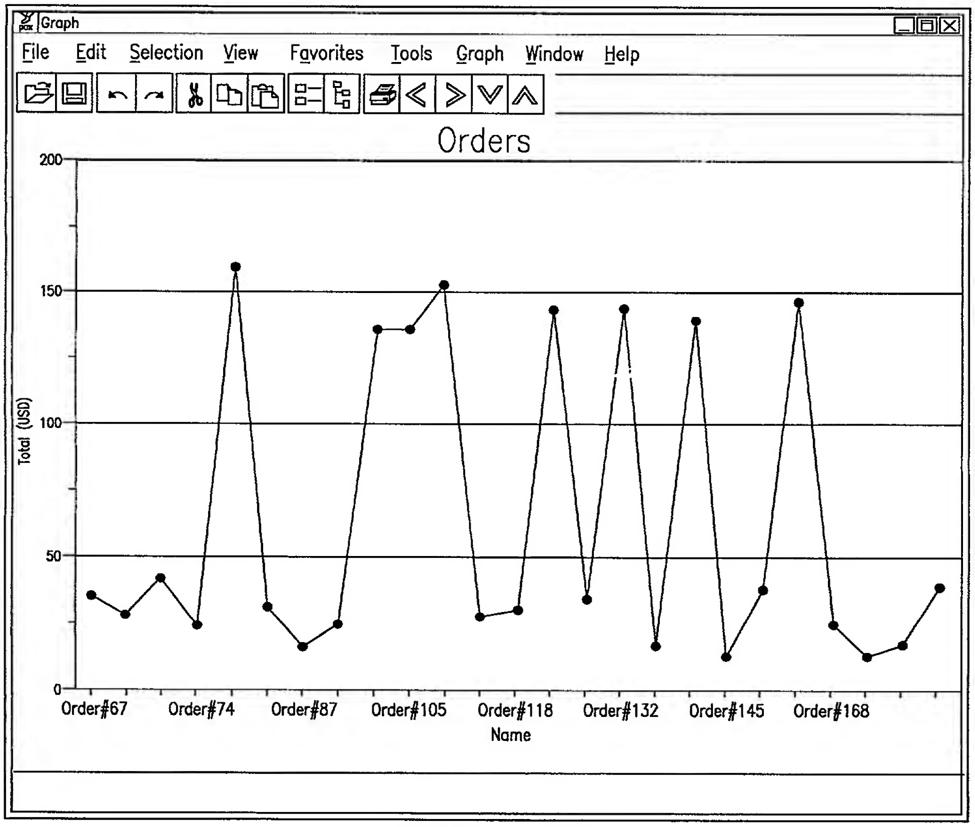
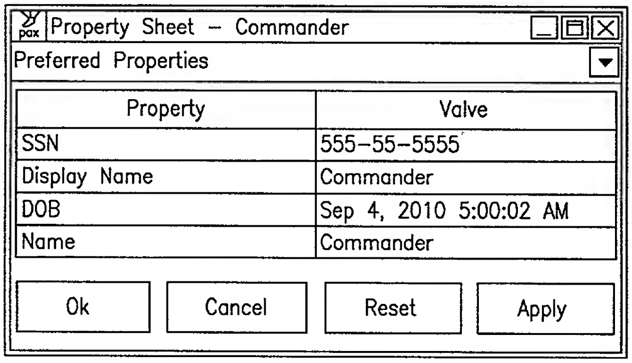

Graph
File Edit Selection View Favorites Tools Graph Window Help
Orders
200
150
100
50
0
Total (USD)
Order#67
Order#74
Order#87
Order#105
Order#118
Order#132
Order#145
Order#168
Name

FIG. 6F



Property Sheet – Commander

Preferred Properties

| Property | Valve |
|---|---|
| SSN | 555-55-5555 |
| Display Name | Commander |
| DOB | Sep 4, 2010 5:00:02 AM |
| Name | Commander |

FIG. 7

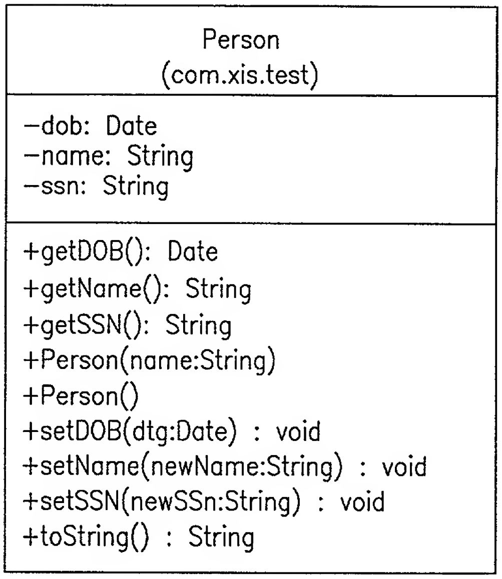
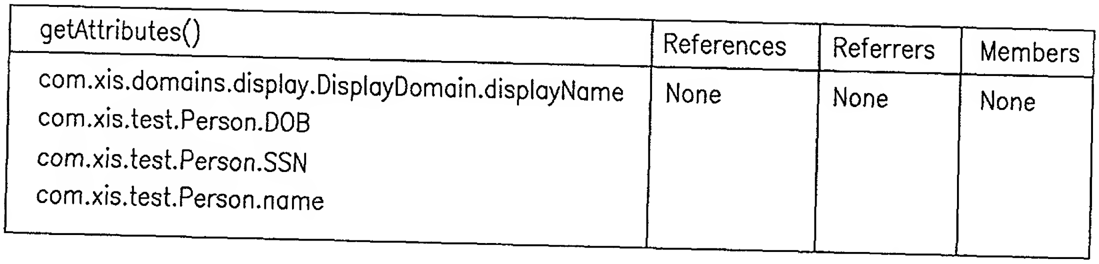


FIG. 8



| getAttributes() | References | Referrers | Members |
|---|---|---|---|
| com.xis.domains.display.DisplayDomain.displayName<br>com.xis.test.Person.DOB<br>com.xis.test.Person.SSN<br>com.xis.test.Person.name | None | None | None |

FIG. 9

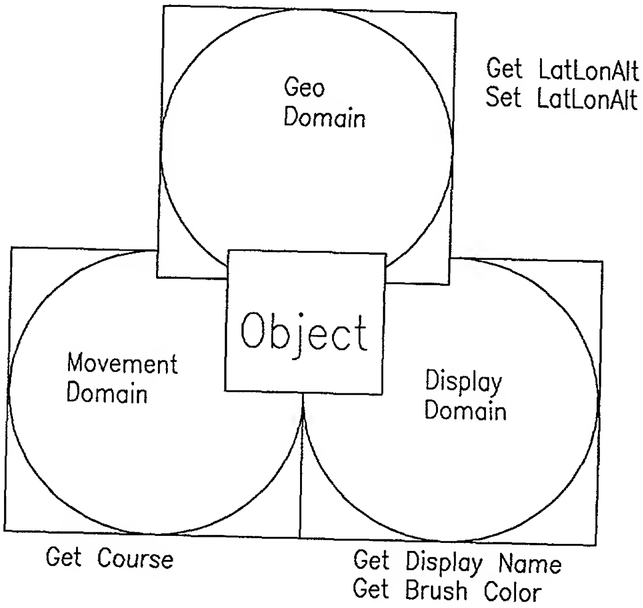


FIG. 10

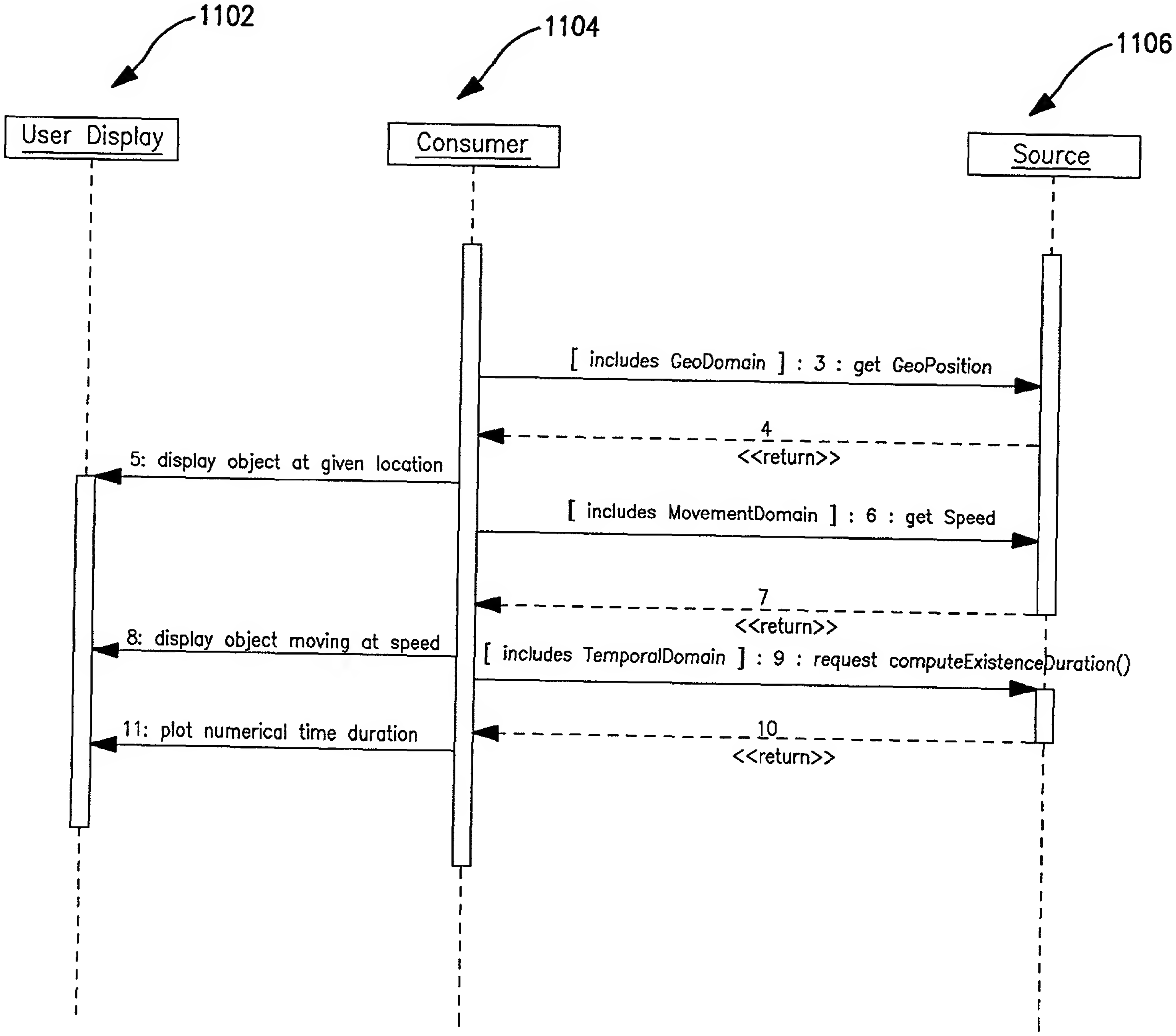
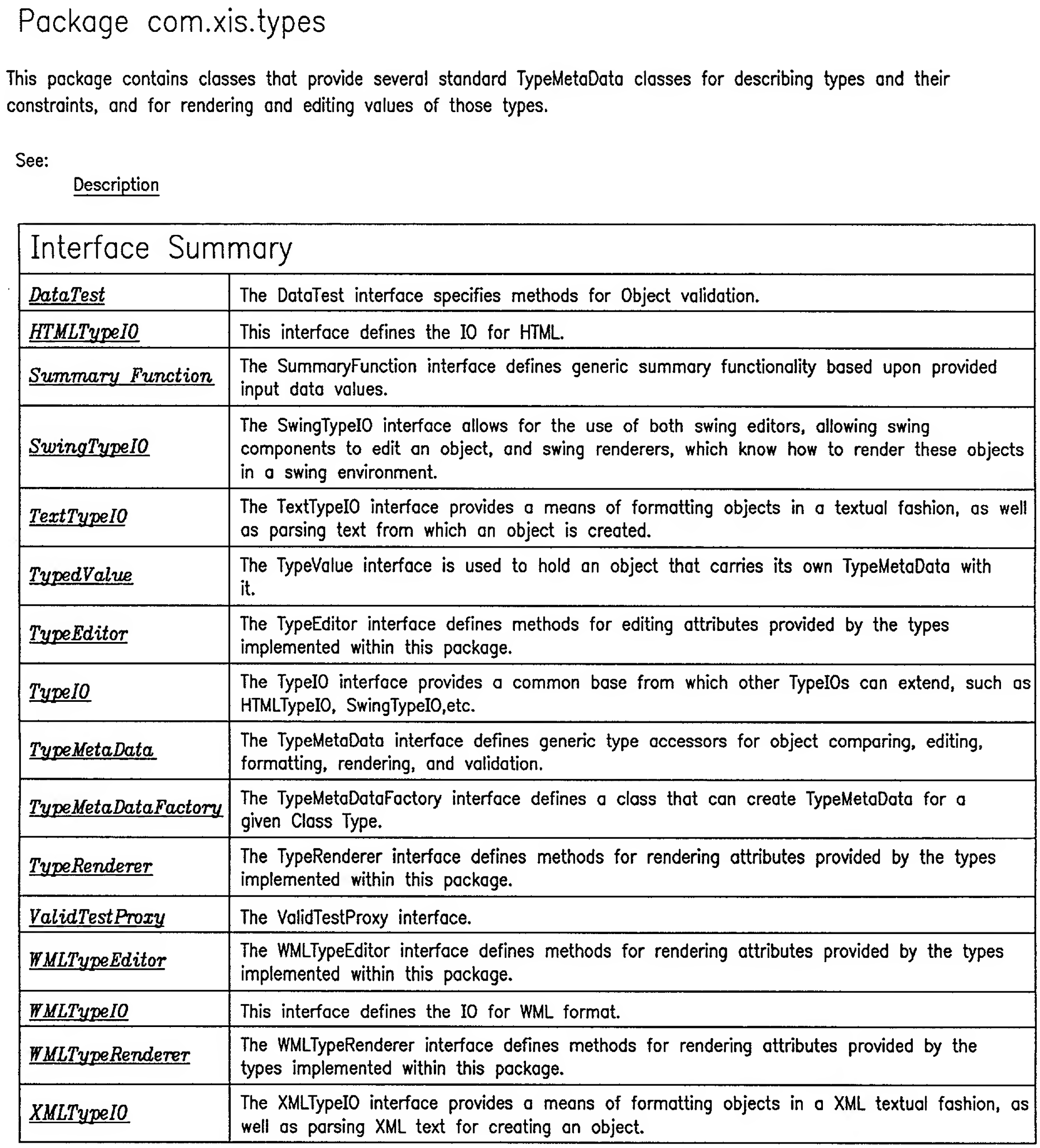

1102
1104
1106
User Display
Consumer
Source
[ includes GeoDomain ] : 3 : get GeoPosition
4
<<return>>
5: display object at given location
[ includes MovementDomain ] : 6 : get Speed
7
<<return>>
8: display object moving at speed
[ includes TemporalDomain ] : 9 : request computeExistenceDuration()
11: plot numerical time duration
10
<<return>>

FIG. 11



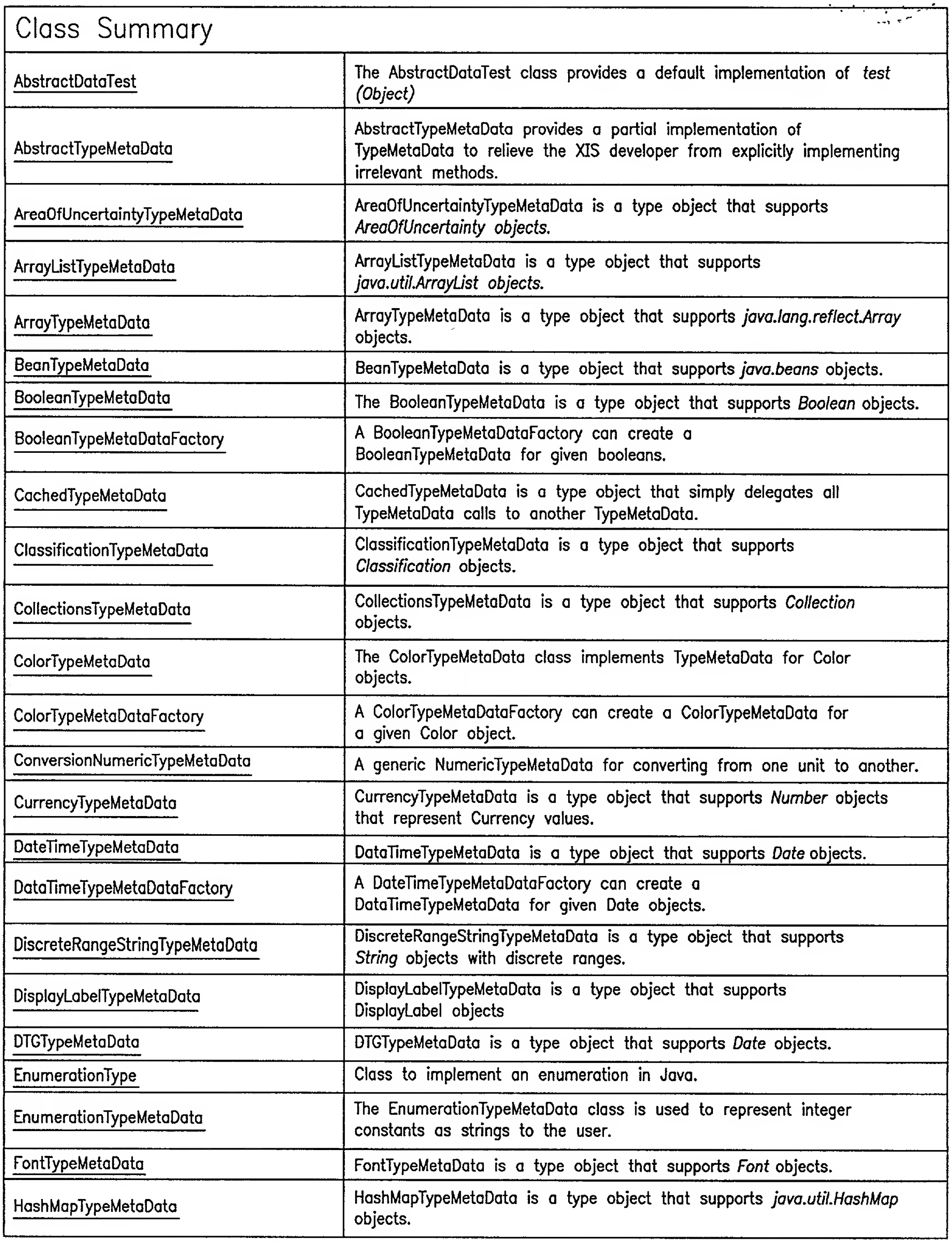
## Package com.xis.types

This package contains classes that provide several standard TypeMetaData classes for describing types and their constraints, and for rendering and editing values of those types.

See:
Description

| Interface Summary | |
|---|---|
| *DataTest* | The DataTest interface specifies methods for Object validation. |
| *HTMLTypeIO* | This interface defines the IO for HTML. |
| *Summary Function* | The SummaryFunction interface defines generic summary functionality based upon provided input data values. |
| *SwingTypeIO* | The SwingTypeIO interface allows for the use of both swing editors, allowing swing components to edit an object, and swing renderers, which know how to render these objects in a swing environment. |
| *TextTypeIO* | The TextTypeIO interface provides a means of formatting objects in a textual fashion, as well as parsing text from which an object is created. |
| *TypedValue* | The TypeValue interface is used to hold an object that carries its own TypeMetaData with it. |
| *TypeEditor* | The TypeEditor interface defines methods for editing attributes provided by the types implemented within this package. |
| *TypeIO* | The TypeIO interface provides a common base from which other TypeIOs can extend, such as HTMLTypeIO, SwingTypeIO,etc. |
| *TypeMetaData* | The TypeMetaData interface defines generic type accessors for object comparing, editing, formatting, rendering, and validation. |
| *TypeMetaDataFactory* | The TypeMetaDataFactory interface defines a class that can create TypeMetaData for a given Class Type. |
| *TypeRenderer* | The TypeRenderer interface defines methods for rendering attributes provided by the types implemented within this package. |
| *ValidTestProxy* | The ValidTestProxy interface. |
| *WMLTypeEditor* | The WMLTypeEditor interface defines methods for rendering attributes provided by the types implemented within this package. |
| *WMLTypeIO* | This interface defines the IO for WML format. |
| *WMLTypeRenderer* | The WMLTypeRenderer interface defines methods for rendering attributes provided by the types implemented within this package. |
| *XMLTypeIO* | The XMLTypeIO interface provides a means of formatting objects in a XML textual fashion, as well as parsing XML text for creating an object. |

FIG. 12A

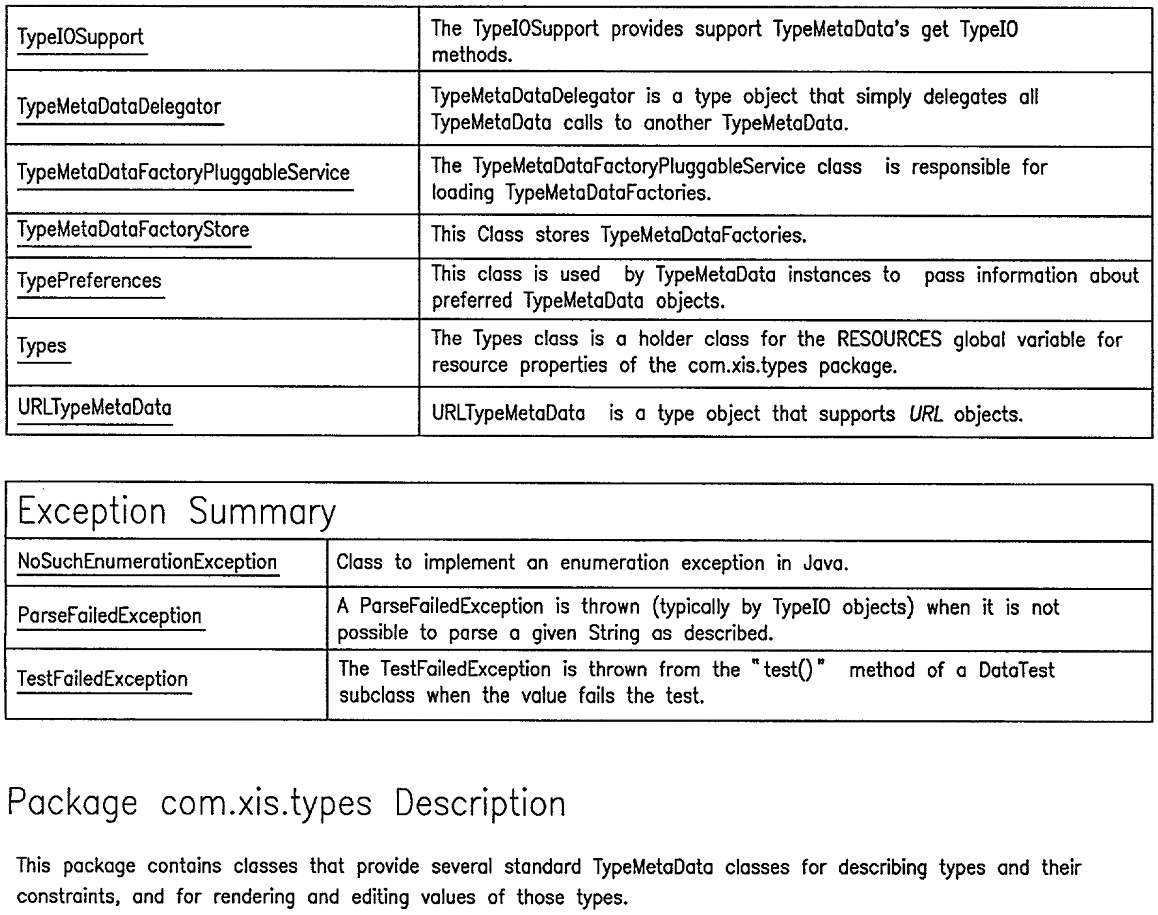


| Class Summary | |
|---|---|
| AbstractDataTest | The AbstractDataTest class provides a default implementation of *test (Object)* |
| AbstractTypeMetaData | AbstractTypeMetaData provides a partial implementation of TypeMetaData to relieve the XIS developer from explicitly implementing irrelevant methods. |
| AreaOfUncertaintyTypeMetaData | AreaOfUncertaintyTypeMetaData is a type object that supports *AreaOfUncertainty objects.* |
| ArrayListTypeMetaData | ArrayListTypeMetaData is a type object that supports *java.util.ArrayList objects.* |
| ArrayTypeMetaData | ArrayTypeMetaData is a type object that supports *java.lang.reflect.Array* objects. |
| BeanTypeMetaData | BeanTypeMetaData is a type object that supports *java.beans* objects. |
| BooleanTypeMetaData | The BooleanTypeMetaData is a type object that supports *Boolean* objects. |
| BooleanTypeMetaDataFactory | A BooleanTypeMetaDataFactory can create a BooleanTypeMetaData for given booleans. |
| CachedTypeMetaData | CachedTypeMetaData is a type object that simply delegates all TypeMetaData calls to another TypeMetaData. |
| ClassificationTypeMetaData | ClassificationTypeMetaData is a type object that supports *Classification* objects. |
| CollectionsTypeMetaData | CollectionsTypeMetaData is a type object that supports *Collection* objects. |
| ColorTypeMetaData | The ColorTypeMetaData class implements TypeMetaData for Color objects. |
| ColorTypeMetaDataFactory | A ColorTypeMetaDataFactory can create a ColorTypeMetaData for a given Color object. |
| ConversionNumericTypeMetaData | A generic NumericTypeMetaData for converting from one unit to another. |
| CurrencyTypeMetaData | CurrencyTypeMetaData is a type object that supports *Number* objects that represent Currency values. |
| DateTimeTypeMetaData | DataTimeTypeMetaData is a type object that supports *Date* objects. |
| DataTimeTypeMetaDataFactory | A DateTimeTypeMetaDataFactory can create a DataTimeTypeMetaData for given Date objects. |
| DiscreteRangeStringTypeMetaData | DiscreteRangeStringTypeMetaData is a type object that supports *String* objects with discrete ranges. |
| DisplayLabelTypeMetaData | DisplayLabelTypeMetaData is a type object that supports DisplayLabel objects |
| DTGTypeMetaData | DTGTypeMetaData is a type object that supports *Date* objects. |
| EnumerationType | Class to implement an enumeration in Java. |
| EnumerationTypeMetaData | The EnumerationTypeMetaData class is used to represent integer constants as strings to the user. |
| FontTypeMetaData | FontTypeMetaData is a type object that supports *Font* objects. |
| HashMapTypeMetaData | HashMapTypeMetaData is a type object that supports *java.util.HashMap* objects. |

FIG. 12B

| | |
|---|---|
| HashSetTypeMetaData | HashSetTypeMetaData is a type object that supports *java.util.HashSet* objects. |
| IconShapeTypeMetaData | IconShapeTypeMetaData is a type object that supports *IconShape* objects. |
| IconTypeMetaData | IconTypeMetaData is a type object that supports *Icon* objects. |
| LinkedListTypeMetaData | LinkedListTypeMetaData is a type object that supports *java.util.LinkedList* objects. |
| ListTypeMetaData | ListTypeMetaData is a type object that supports *java.util.List* objects. |
| MouseMapProxy | The MouseMapProxy class allows TypeEditors access to the map without requiring them to having any compile time knowledge of the map's existence. |
| NumberComparator | An implementation of the Comparator interface that compares two objects that extend Number, or that both implement Comparable, with the class of one assignable from the other. |
| NumericTypeMetaData | NumericTypeMetaData is a type object that supports *Number* objects. |
| NumericTypeMetaDataFactory | A NumericTypeMetaDataFactory can create NumericTypeMetaData for a given class type or method return type. |
| ObjectTypeMetaData | ObjectTypeMetaData is a type that supports a simple *Object* and is provided to quickly add arbitrary attribute types to a Data Source Interface without writing a more specific type handler. |
| PercentTypeMetaData | PercentTypeMetaData is a type object that supports *Number* objects that represent Percent(%) values. |
| ProbabilityTypeMetaData | ProbabilityTypeMetaData is a type object that supports *Number* objects that represent Probability values. |
| RenamedTypeMetaData | RenamedTypeMetaData simply delegates all TypeMetaData calls to another TypeMetaData except for the *getName()*, which is overridden with the given value. |
| ResizedTextTypeMetaData | ResizedTextTypeMetaData simply delegates all TypeMetaData calls to another TypeMetaData except for the *getPixelWidth()*, which is overridden with the given value. |
| Resources | The Resources class is automatically generated and must be public, but it is intended to be used only by Java's internationalization support classes. |
| SmartDurationTypeMetaData | A SmartDurationTypeMetaData for converting from one time unit to another based on the magnitude of the duration value. |
| StringTypeMetaData | StringTypeMetaData is a type object that supports *String* objects. |
| StringTypeMetaDataFactory | A StringTypeMetaDataFactory can create a StringTypeMetaData for a given String object. |
| TextTypeMetaData | TextTypeMetaData is a type object that supports *Text* objects. |
| TypedValueTypeMetaData | TypedValueTypeMetaData is a type object that supports *TypedValue* objects. |
| TypedEditorBeanContextChildSupport | The TypeEditorBeanContextChildSupport class handles most of the responsibilities of a TypeEditor and a BeanContextChild. |
| TypedEditorSupport | The TypeEditorSupport class handles most of the responsiblities of a TypeEditor. |
| TypeIOPluggableService | The TypeIOPluggableService class is responsible for loading TypeIOs. |
| TypeIORegistry | The TypeIORegistry class is a registry for different implementations of TypeIO classes. |

FIG. 12C



| | |
|---|---|
| TypeIOSupport | The TypeIOSupport provides support TypeMetaData's get TypeIO methods. |
| TypeMetaDataDelegator | TypeMetaDataDelegator is a type object that simply delegates all TypeMetaData calls to another TypeMetaData. |
| TypeMetaDataFactoryPluggableService | The TypeMetaDataFactoryPluggableService class is responsible for loading TypeMetaDataFactories. |
| TypeMetaDataFactoryStore | This Class stores TypeMetaDataFactories. |
| TypePreferences | This class is used by TypeMetaData instances to pass information about preferred TypeMetaData objects. |
| Types | The Types class is a holder class for the RESOURCES global variable for resource properties of the com.xis.types package. |
| URLTypeMetaData | URLTypeMetaData is a type object that supports *URL* objects. |

| Exception Summary | |
|---|---|
| NoSuchEnumerationException | Class to implement an enumeration exception in Java. |
| ParseFailedException | A ParseFailedException is thrown (typically by TypeIO objects) when it is not possible to parse a given String as described. |
| TestFailedException | The TestFailedException is thrown from the "test()" method of a DataTest subclass when the value fails the test. |

## Package com.xis.types Description

This package contains classes that provide several standard TypeMetaData classes for describing types and their constraints, and for rendering and editing values of those types.

FIG. 12D

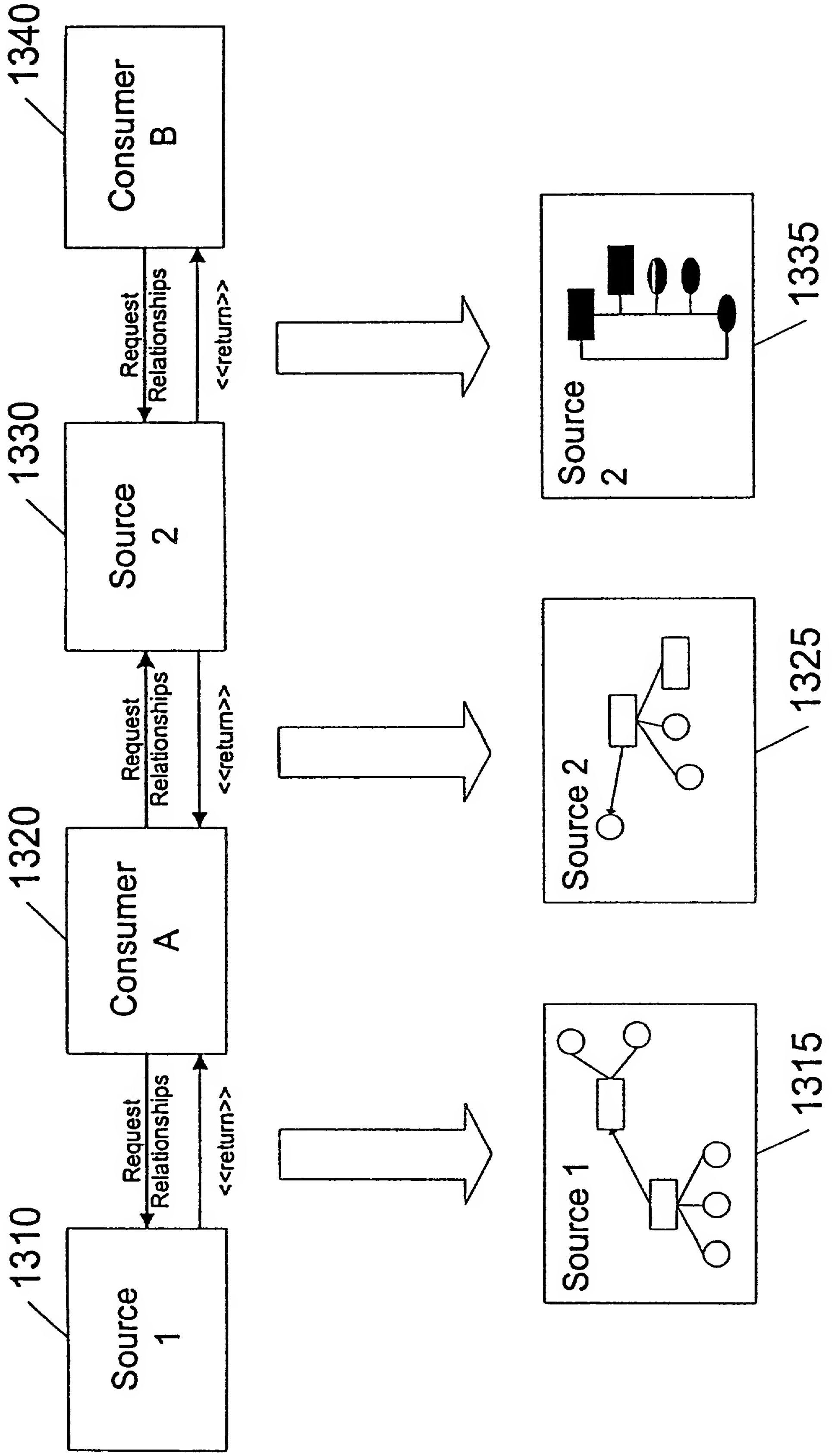

1310
Source 1
Request Relationships
<<return>>
1320
Consumer A
Request Relationships
<<return>>
1330
Source 2
Request Relationships
<<return>>
1340
Consumer B
Source 1
1315
Source 2
1325
Source 2
1335

FIG. 13

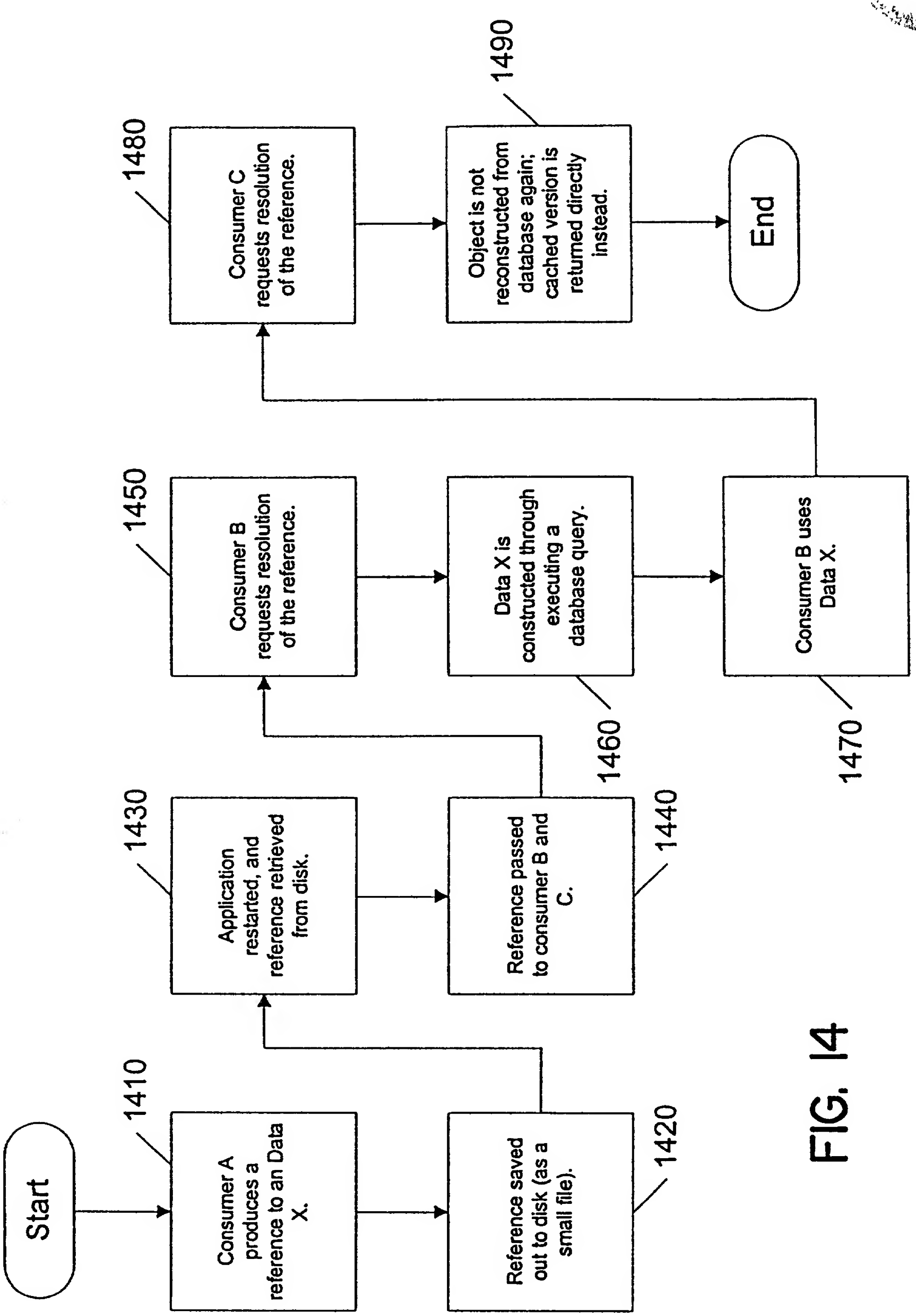

Start
1410
Consumer A produces a reference to an Data X.
1420
Reference saved out to disk (as a small file).
1430
Application restarted, and reference retrieved from disk.
1440
Reference passed to consumer B and C.
1450
Consumer B requests resolution of the reference.
1460
Data X is constructed through executing a database query.
1470
Consumer B uses Data X.
1480
Consumer C requests resolution of the reference.
1490
Object is not reconstructed from database again; cached version is returned directly instead.
End

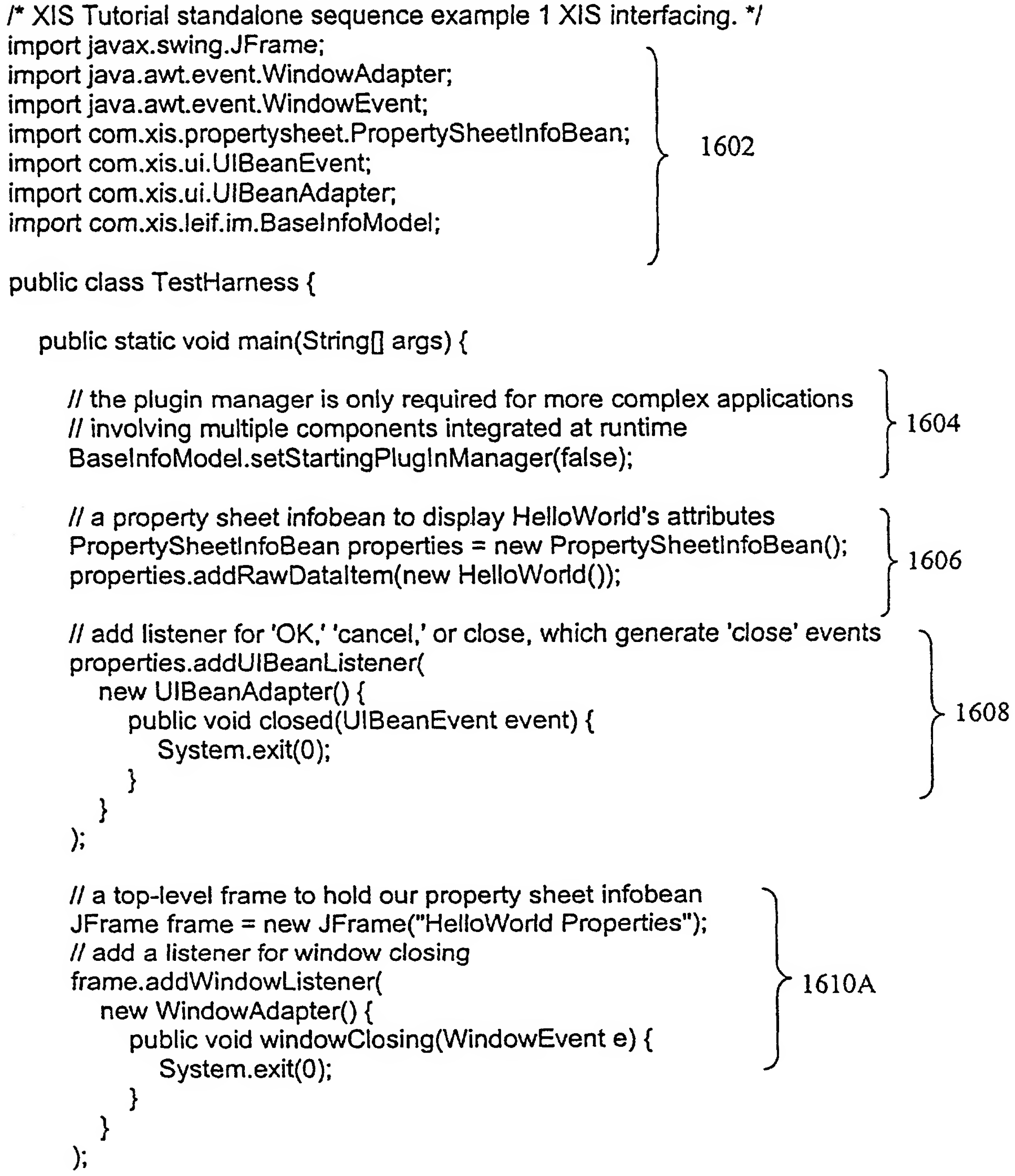
FIG. 14

## HelloWorld.java

```
/* XIS Tutorial standalone sequence example 1 data class. */

public class HelloWorld {
   private float value = 1.5f;

   public String toString() {
      return "Hello World!";
   }

   public int getID() {
      return 5;
   }

   public float getValue() {
      return value;
   }

   // uncomment this to make "value" editable
   /*
   public void setValue(float value) {
      this.value = value;
   }
   */

}
```

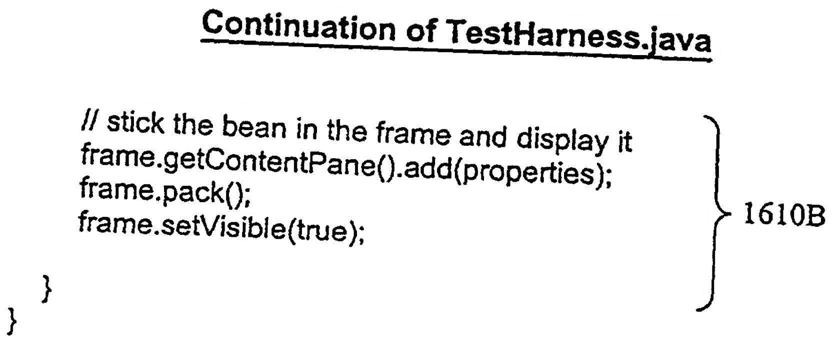
FIG. 15

## TestHarness.java



```
/* XIS Tutorial standalone sequence example 1 XIS interfacing. */
import javax.swing.JFrame;
import java.awt.event.WindowAdapter;
import java.awt.event.WindowEvent;
import com.xis.propertysheet.PropertySheetInfoBean;
import com.xis.ui.UIBeanEvent;
import com.xis.ui.UIBeanAdapter;
import com.xis.leif.im.BaseInfoModel;

public class TestHarness {

   public static void main(String[] args) {

      // the plugin manager is only required for more complex applications
      // involving multiple components integrated at runtime
      BaseInfoModel.setStartingPlugInManager(false);

      // a property sheet infobean to display HelloWorld's attributes
      PropertySheetInfoBean properties = new PropertySheetInfoBean();
      properties.addRawDataItem(new HelloWorld());

      // add listener for 'OK,' 'cancel,' or close, which generate 'close' events
      properties.addUIBeanListener(
         new UIBeanAdapter() {
            public void closed(UIBeanEvent event) {
               System.exit(0);
            }
         }
      );

      // a top-level frame to hold our property sheet infobean
      JFrame frame = new JFrame("HelloWorld Properties");
      // add a listener for window closing
      frame.addWindowListener(
         new WindowAdapter() {
            public void windowClosing(WindowEvent e) {
               System.exit(0);
            }
         }
      );
```

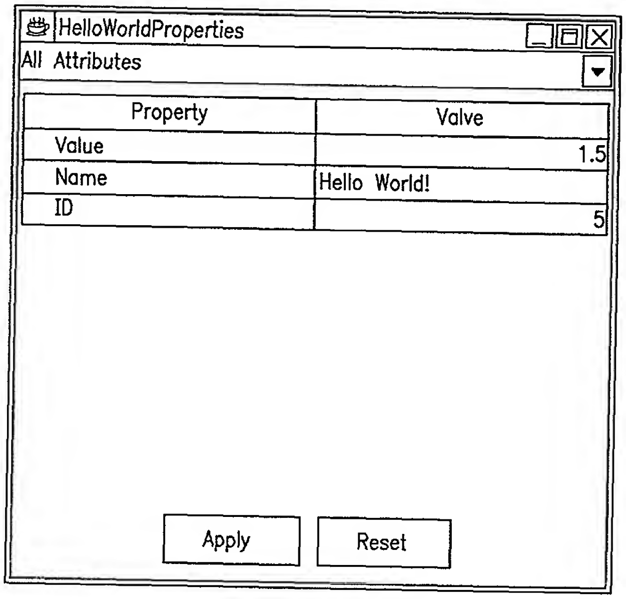
FIG. 16A



**Continuation of TestHarness.java**

```
        // stick the bean in the frame and display it
        frame.getContentPane().add(properties);
        frame.pack();
        frame.setVisible(true);

    }
}
```

FIG. 16B



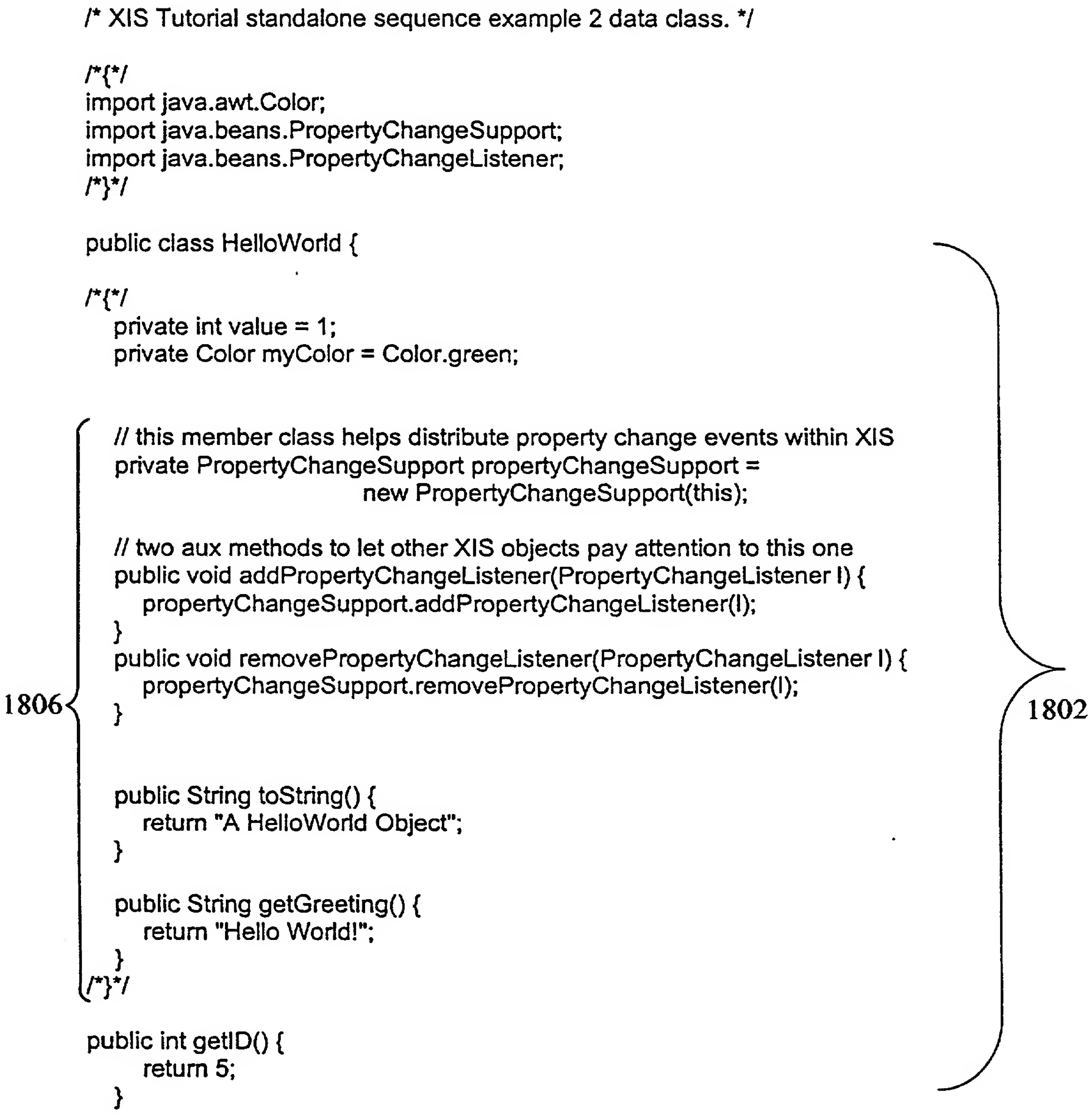
HelloWorldProperties

All Attributes

| Property | Valve |
|---|---|
| Value | 1.5 |
| Name | Hello World! |
| ID | 5 |

FIG. 17

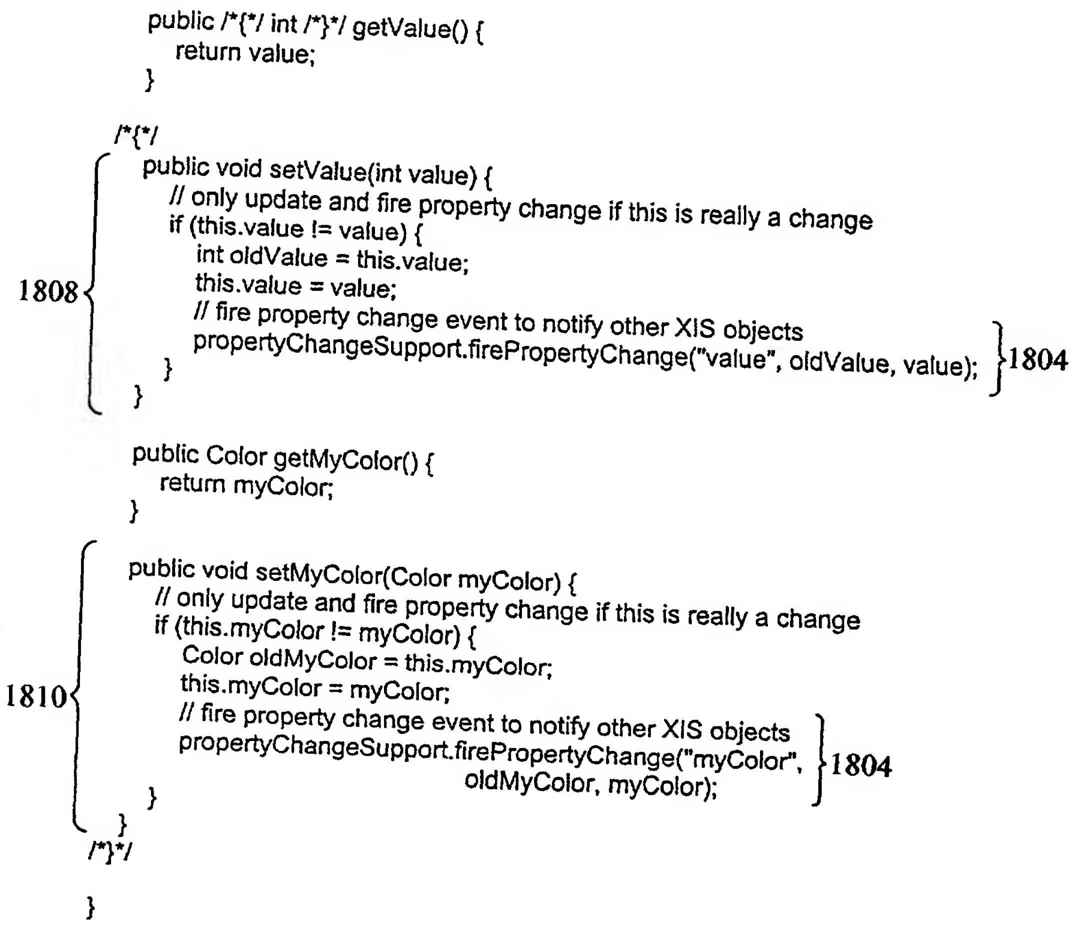
## HelloWorld.java



```
/* XIS Tutorial standalone sequence example 2 data class. */

/*{*/
import java.awt.Color;
import java.beans.PropertyChangeSupport;
import java.beans.PropertyChangeListener;
/*}*/

public class HelloWorld {

/*{*/
   private int value = 1;
   private Color myColor = Color.green;

   // this member class helps distribute property change events within XIS
   private PropertyChangeSupport propertyChangeSupport =
                                 new PropertyChangeSupport(this);

   // two aux methods to let other XIS objects pay attention to this one
   public void addPropertyChangeListener(PropertyChangeListener l) {
      propertyChangeSupport.addPropertyChangeListener(l);
   }
   public void removePropertyChangeListener(PropertyChangeListener l) {
      propertyChangeSupport.removePropertyChangeListener(l);
   }


   public String toString() {
      return "A HelloWorld Object";
   }

   public String getGreeting() {
      return "Hello World!";
   }
/*}*/

public int getID() {
      return 5;
   }
```

FIG. 18A

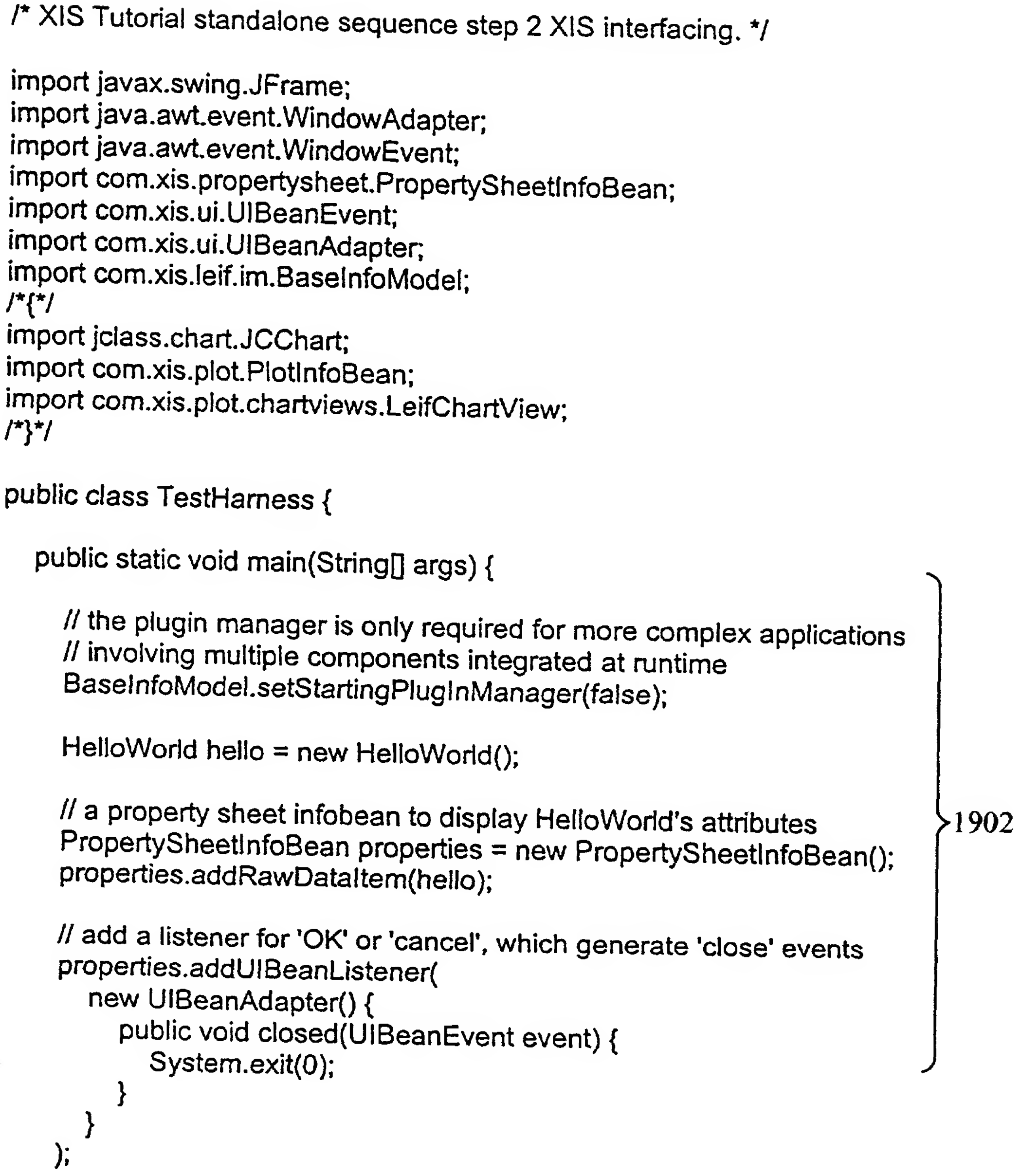
## Continuation of of HelloWorld.java



```
    public /*{*/ int /*}*/ getValue() {
        return value;
    }

  /*{*/
    public void setValue(int value) {
        // only update and fire property change if this is really a change
        if (this.value != value) {
            int oldValue = this.value;
            this.value = value;
            // fire property change event to notify other XIS objects
            propertyChangeSupport.firePropertyChange("value", oldValue, value);
        }
    }

    public Color getMyColor() {
        return myColor;
    }

    public void setMyColor(Color myColor) {
        // only update and fire property change if this is really a change
        if (this.myColor != myColor) {
            Color oldMyColor = this.myColor;
            this.myColor = myColor;
            // fire property change event to notify other XIS objects
            propertyChangeSupport.firePropertyChange("myColor",
                                        oldMyColor, myColor);
        }
    }
  /*}*/

}
```

FIG. 18B

## TestHarness.java



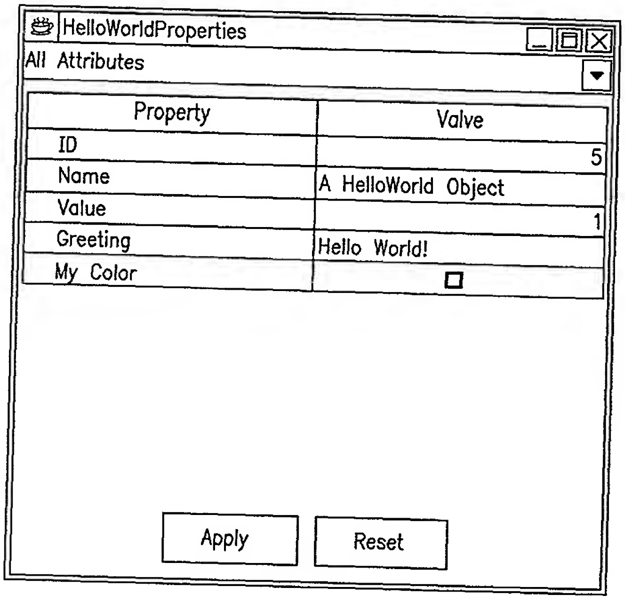
```
/* XIS Tutorial standalone sequence step 2 XIS interfacing. */

import javax.swing.JFrame;
import java.awt.event.WindowAdapter;
import java.awt.event.WindowEvent;
import com.xis.propertysheet.PropertySheetInfoBean;
import com.xis.ui.UIBeanEvent;
import com.xis.ui.UIBeanAdapter;
import com.xis.leif.im.BaseInfoModel;
/*{*/
import jclass.chart.JCChart;
import com.xis.plot.PlotInfoBean;
import com.xis.plot.chartviews.LeifChartView;
/*}*/

public class TestHarness {

   public static void main(String[] args) {

      // the plugin manager is only required for more complex applications
      // involving multiple components integrated at runtime
      BaseInfoModel.setStartingPlugInManager(false);

      HelloWorld hello = new HelloWorld();

      // a property sheet infobean to display HelloWorld's attributes
      PropertySheetInfoBean properties = new PropertySheetInfoBean();
      properties.addRawDataItem(hello);

      // add a listener for 'OK' or 'cancel', which generate 'close' events
      properties.addUIBeanListener(
         new UIBeanAdapter() {
            public void closed(UIBeanEvent event) {
               System.exit(0);
            }
         }
      );
```

FIG. 19A

## Continuation of TestHarness.java

```
/*{*/
      // a top-level frame to hold our property sheet infobean
      JFrame propertySheetFrame = new JFrame("HelloWorld Properties");
      // add a listener for window closing
      propertySheetFrame.addWindowListener(
         new WindowAdapter() {
            public void windowClosing(WindowEvent e) {
               System.exit(0);
            }
         }
      );

      // stick the property Sheet bean in the frame and display it
      propertySheetFrame.getContentPane().add(properties);
      propertySheetFrame.pack();                                          1904
      propertySheetFrame.setVisible(true);

      // now we create a plot infobean to plot HelloWorld's numeric attribute
1906  PlotInfoBean plot = new PlotInfoBean();
      plot.addRawDataItems(new Object[] { hello });
      plot.setChartType(JCChart.BAR);
      // the alternatives are SCATTER_PLOT, PLOT, AREA, PIE, CANDLE,
      // and STACKING_BAR, though not all will make sense in this example

      // a top-level frame as before to hold our property sheet infobean
      JFrame plotFrame = new JFrame("HelloWorld Plot");

      // stick the plot bean in and put it up
      plotFrame.getContentPane().add(plot);
      plotFrame.pack();
      plotFrame.setVisible(true);
/*}*/

   }

}
```

FIG. 19B



HelloWorldProperties

All Attributes

| Property | Valve |
|---|---|
| ID | 5 |
| Name | A HelloWorld Object |
| Value | 1 |
| Greeting | Hello World! |
| My Color | □ |

FIG. 20

## HelloWorld.java

```
/* XIS Tutorial standalone sequence step 3 data class. */
import java.awt.Color;
// (property change support moved to HelloWorldTranslator)

public class HelloWorld {
   private int value = 1;
   private Color myColor = Color.green;

   public String toString() {
      return "A HelloWorld Object";
   }

   public String getGreeting() {
      return "Hello World!";
   }

   public int getID() {
      return 5;
   }

   public int getValue() {
      return value;
   }

/*{*/
   public void setValue(int value) {
      // all the worrying about change events is moved to the translator,
      // so we just need to do the bare change operation (unless nonXIS
      // components need to listen to PropertyChanges)
      this.value = value;
   }
/*}*/

   public Color getMyColor() {
      return myColor;
   }

/*{*/
   public void setMyColor(Color myColor) {
      // just need to set the value (see setValue())
      this.myColor = myColor;
   }
/*}*/

}
```

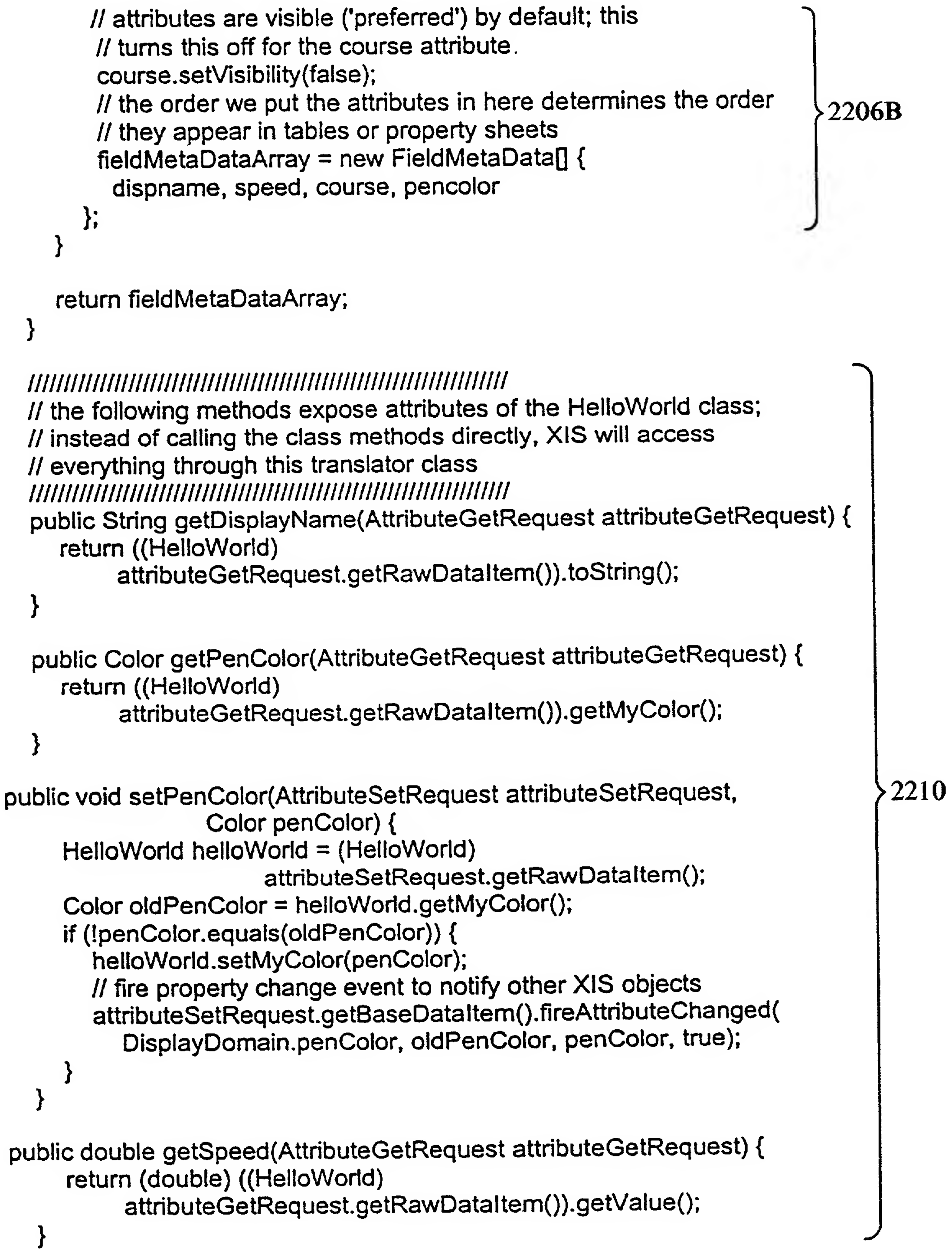
FIG. 21

**HelloWorldTranslator.java**

```
/* XIS Tutorial standalone sequence step 3 data translator class. */

/*{*/
import com.xis.leif.im.AttributeGetRequest;
import com.xis.leif.im.AttributeSetRequest;
import com.xis.leif.im.Domain;
import com.xis.leif.im.Translator;
import com.xis.leif.im.FieldMetaData;
import com.xis.domains.display.DisplayDomain;
import com.xis.domains.movement.MovementDomain;
import java.awt.Color;

      public class HelloWorldTranslator extends Translator {

        // the domains from which canned attribute metadata will be taken
        // NOTE, if an attribute appears in the methods below but its domain
2202    //      is NOT listed here, THE ATTRIBUTE WILL BE IGNORED BY XIS
        private static final Domain[] baseDomains = new Domain[] {
            DisplayDomain.getDomain(), MovementDomain.getDomain()
        };

2203    // store info about the fields, such as whether they are preferred or not
        private FieldMetaData[] fieldMetaDataArray;

        // Return the Domains that describe the Attributes.
2204    public Domain[] getBaseDomains() {
            return baseDomains;
        }

        // this method returns info on each field defined in the methods below
        public FieldMetaData[] getFieldMetaDataArray() {

            if (fieldMetaDataArray == null) {
               // initialize default metadata
             FieldMetaData dispname = new
                            FieldMetaData(DisplayDomain.displayName);
2206A          FieldMetaData pencolor = new
                            FieldMetaData(DisplayDomain.penColor);
               FieldMetaData speed = new
                            FieldMetaData(MovementDomain.speed);
             FieldMetaData course = new
                            FieldMetaData(MovementDomain.course);
```

FIG. 22A

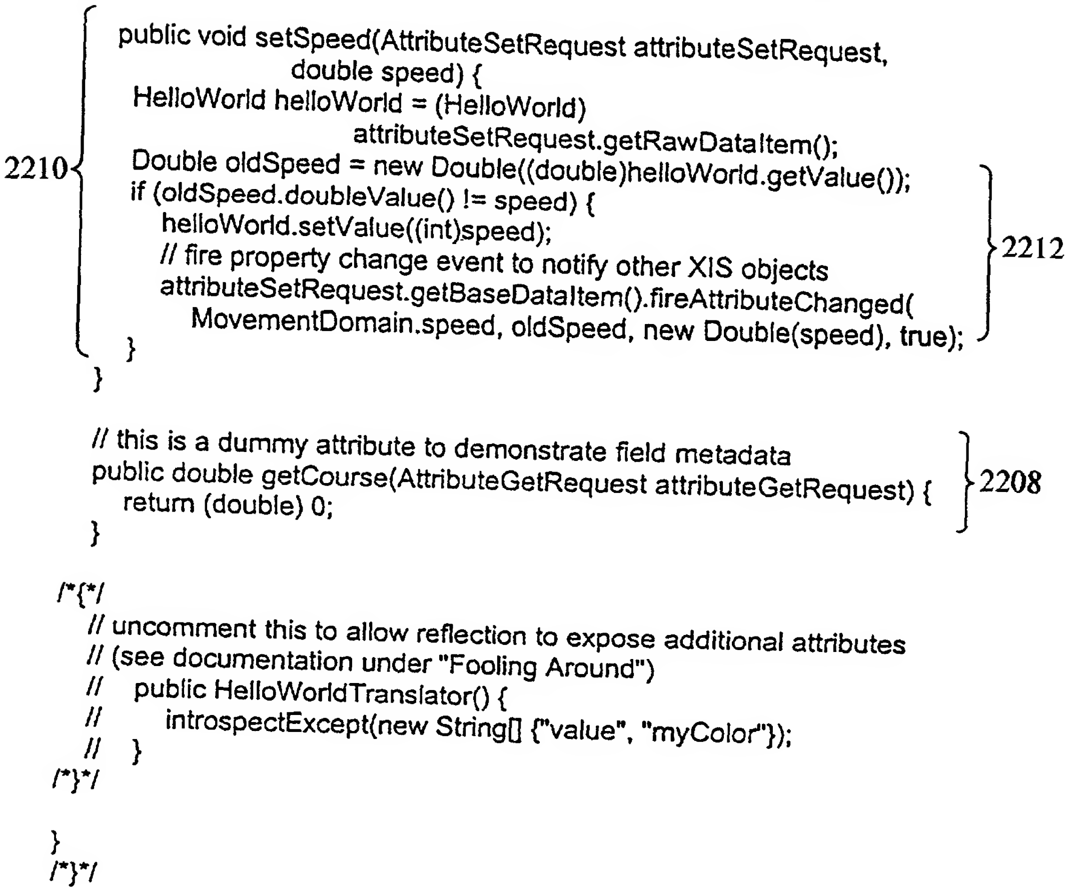
## Continuation of HelloWorldTranslator.java



```
          // attributes are visible ('preferred') by default; this
          // turns this off for the course attribute.
          course.setVisibility(false);
          // the order we put the attributes in here determines the order
          // they appear in tables or property sheets
          fieldMetaDataArray = new FieldMetaData[] {
            dispname, speed, course, pencolor
          };
        }

        return fieldMetaDataArray;
      }

      ////////////////////////////////////////////////////////////////
      // the following methods expose attributes of the HelloWorld class;
      // instead of calling the class methods directly, XIS will access
      // everything through this translator class
      ////////////////////////////////////////////////////////////////
      public String getDisplayName(AttributeGetRequest attributeGetRequest) {
        return ((HelloWorld)
              attributeGetRequest.getRawDataItem()).toString();
      }

      public Color getPenColor(AttributeGetRequest attributeGetRequest) {
        return ((HelloWorld)
              attributeGetRequest.getRawDataItem()).getMyColor();
      }

    public void setPenColor(AttributeSetRequest attributeSetRequest,
                        Color penColor) {
        HelloWorld helloWorld = (HelloWorld)
                          attributeSetRequest.getRawDataItem();
        Color oldPenColor = helloWorld.getMyColor();
        if (!penColor.equals(oldPenColor)) {
          helloWorld.setMyColor(penColor);
          // fire property change event to notify other XIS objects
          attributeSetRequest.getBaseDataItem().fireAttributeChanged(
             DisplayDomain.penColor, oldPenColor, penColor, true);
        }
      }

    public double getSpeed(AttributeGetRequest attributeGetRequest) {
        return (double) ((HelloWorld)
              attributeGetRequest.getRawDataItem()).getValue();
      }
```

FIG. 22B

## Continuation of HelloWorldTranslator.java



```
    public void setSpeed(AttributeSetRequest attributeSetRequest,
                double speed) {
      HelloWorld helloWorld = (HelloWorld)
                     attributeSetRequest.getRawDataItem();
      Double oldSpeed = new Double((double)helloWorld.getValue());
      if (oldSpeed.doubleValue() != speed) {
        helloWorld.setValue((int)speed);
        // fire property change event to notify other XIS objects
        attributeSetRequest.getBaseDataItem().fireAttributeChanged(
          MovementDomain.speed, oldSpeed, new Double(speed), true);
      }
    }

    // this is a dummy attribute to demonstrate field metadata
    public double getCourse(AttributeGetRequest attributeGetRequest) {
      return (double) 0;
    }

  /*{*/
    // uncomment this to allow reflection to expose additional attributes
    // (see documentation under "Fooling Around")
    //   public HelloWorldTranslator() {
    //       introspectExcept(new String[] {"value", "myColor"});
    //   }
  /*}*/

  }
  /*}*/
```

FIG. 22C

## TestHarness.java

```
/* XIS Tutorial standalone sequence step 3 XIS interfacing. */

import javax.swing.JFrame;
import java.awt.event.WindowAdapter;
import java.awt.event.WindowEvent;
import com.xis.propertysheet.PropertySheetInfoBean;
import com.xis.ui.UIBeanEvent;
import com.xis.ui.UIBeanAdapter;
import com.xis.leif.im.BaseInfoModel;
import jclass.chart.JCChart;
import com.xis.plot.PlotInfoBean;
import com.xis.plot.chartviews.LeifChartView;
/*{*/
import com.xis.leif.im.TranslatorRegistry;
import com.xis.leif.im.LeifDataItem;
import com.xis.leif.im.InfoModel;
import com.xis.leif.im.BaseInfoModel;
import com.xis.domains.movement.MovementDomain;
import com.xis.domains.movement.MovementDomainWrapper;
import com.xis.leif.im.LeifDataItemDelegator;
import java.lang.reflect.InvocationTargetException;
import com.xis.leif.im.UndefinedLeifAttributeException;
/*}*/

public class TestHarness {

/*{*/
   protected static LeifDataItem leifHello;

   static {
      // Register the translator for HelloWorld.  In fact this is really
      // only necessary when we have not followed the standard naming
      // convention (see docs), but it can't hurt.
      TranslatorRegistry.getTranslatorRegistry().registerObjectSchema(
         HelloWorld.class, HelloWorldTranslator.class);
   }
/*}*/

public static void main(String[] args) {

      // the plugin manager is only required for more complex applications
      // involving multiple components integrated at runtime
      BaseInfoModel.setStartingPlugInManager(false);

      HelloWorld hello = new HelloWorld();
```

2302

FIG. 23A

## Continuation of TestHarness.java

```
    // a property sheet infobean to display HelloWorld's attributes
    PropertySheetInfoBean properties = new PropertySheetInfoBean();
    properties.addRawDataItem(hello);

    // add a listener for 'OK' or 'cancel', which generate 'close' events
    properties.addUIBeanListener(
       new UIBeanAdapter() {
          public void closed(UIBeanEvent event) {
             System.exit(0);
          }
       }
    );

    // a top-level frame to hold our property sheet infobean
    JFrame propertySheetFrame = new JFrame("HelloWorld Properties");
    // add a listener for window closing
    propertySheetFrame.addWindowListener(
       new WindowAdapter() {
          public void windowClosing(WindowEvent e) {
             System.exit(0);
          }
       }
    );

    // stick the property Sheet bean in the frame and display it
    propertySheetFrame.getContentPane().add(properties);
    propertySheetFrame.pack();
    propertySheetFrame.setVisible(true);
// now we create a plot infobean to plot HelloWorld's numeric attribute
    PlotInfoBean plot = new PlotInfoBean();
    plot.addRawDataItems(new Object[] { hello });
    plot.setChartType(JCChart.BAR);
    // the alternatives are SCATTER_PLOT, PLOT, AREA, PIE, CANDLE,
    // and STACKING_BAR, though not all will make sense in this example

    // We can set the attribute for initial display on the plot;
    // if we do, this must consist of the attribute name preceded
    // by the fully-qualified classname which ORIGINALLY DEFINES
    // the attributeDescriptor -- i.e., using "HelloWorld.speed"
    // here will NOT work!  If the descriptor is not defined in a
    // domain or translator class, then it will have been defined
    // dynamically through introspection when the first instance
    // of the data item is dropped into an XIS InfoBean.
    plot.setYAxisAttribute(
       "com.xis.domains.movement.MovementDomain.speed");
```

FIG. 23B

## Continuation of TestHarness.java

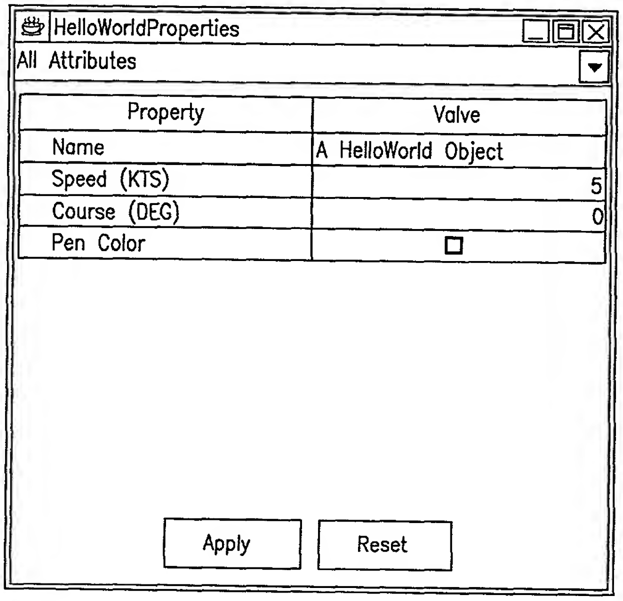
```
        plot.setDynamicAdjustment(true);  // so axes track value magnitude
        plot.setBarChartAdjusting(true);  // needed in some cases for bar chart

        // a top-level frame as before to hold our plot infobean
        JFrame plotFrame = new JFrame("HelloWorld Plot");

        // stick the plot bean in and put it up
        plotFrame.getContentPane().add(plot);
        plotFrame.pack();
        plotFrame.setVisible(true);

/*{*/
        // create a leifDataItem version of hello and start a thread that
        // will increase it
        leifHello =
           BaseInfoModel.getBaseInfoModel().getLeifDataItem(hello);
        new Accelerate();
/*}*/
    } // main

}

/*{*/
// thread to update the speed attribute on the leifHello instance we created
class Accelerate extends Thread {

        public Accelerate() {
           super("Accelerator Thread");
           start();
        }

        public void run() {

           // wrap the LeifDataItem leifHello in a convenience wrapper that
           // gives access to attributes within that domain, if they exist
           MovementDomainWrapper helloMovementWrapper =
              MovementDomain.takeWrapper(TestHarness.leifHello);
```

FIG. 23C

**Continuation of TestHarness.java**

```
            while (true) {

                // sleep for 0.5 seconds, then...
                try {
                    sleep(500);
                } catch (InterruptedException e) {
                    System.exit(1);
                }

                // ..update the speed attribute
                try {
                    helloMovementWrapper.setSpeed(
                                helloMovementWrapper.getSpeed()+1);
                } catch (UndefinedLeifAttributeException ulae) {
                    // exception if this data item doesn't have this attribute
                    System.exit(1); // usually we would do something better
                } catch (InvocationTargetException ite) {
                    // sweep up any exception tossed by the underlying raw item
                    System.exit(1); // usually we would do something better
                }
            } // while
        } // run()
};
/*}*/
```

FIG. 23D



| Property | Valve |
|---|---|
| Name | A HelloWorld Object |
| Speed (KTS) | 5 |
| Course (DEG) | 0 |
| Pen Color | □ |

FIG. 24A

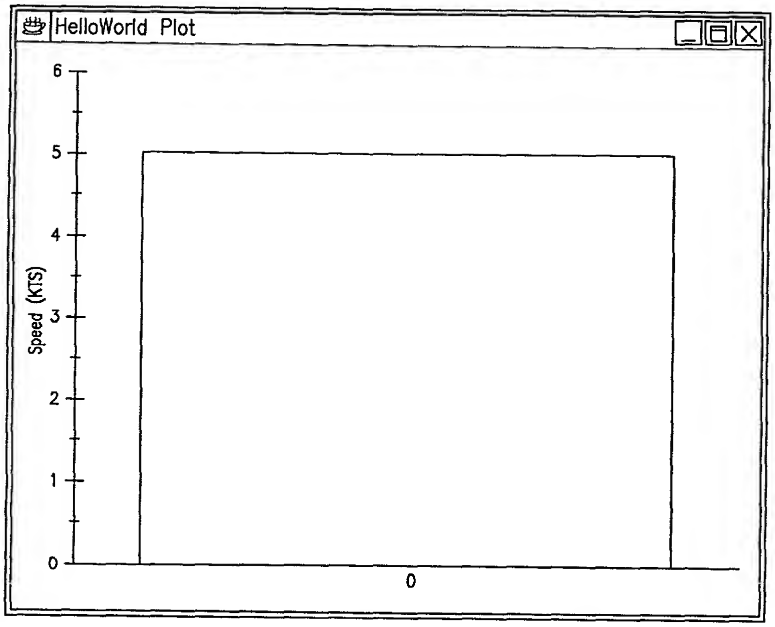


FIG. 24B

**HelloWorld.java**

```
/* XIS Tutorial standalone sequence step 4 data class. */

import java.awt.Color;
/*{*/
import com.xis.leif.im.FieldMetaData;
import com.xis.domains.display.DisplayDomain;
import com.xis.domains.movement.MovementDomain;
import com.xis.leif.im.Domain;
import com.xis.leif.im.AttributeGetRequest;
import com.xis.leif.im.AttributeSetRequest;
import com.xis.leif.im.AttributeDescriptor;
import java.beans.PropertyChangeSupport;
import java.beans.PropertyChangeListener;
/*}*/

public class HelloWorld {

   private int value = 1;
   private Color myColor = Color.green;

/*{*/
   public static AttributeDescriptor getDisplayNameDescriptor() {
      return DisplayDomain.displayName;
   }                                                              2502
   public static AttributeDescriptor getSpeedDescriptor() {
      return MovementDomain.speed;
   }
   public static AttributeDescriptor getPenColorDescriptor() {
      return DisplayDomain.penColor;
   }
/*}*/

/*{*/   // this property change support code as in step 2  /*}*/
   // this member class helps distribute property change events within XIS
   private PropertyChangeSupport propertyChangeSupport =
                              new PropertyChangeSupport(this);

// two aux methods to let other XIS objects pay attention to this one
   public void addPropertyChangeListener(PropertyChangeListener l) {      2504
      propertyChangeSupport.addPropertyChangeListener(l);
   }
   public void removePropertyChangeListener(PropertyChangeListener l) {
      propertyChangeSupport.removePropertyChangeListener(l);
   }
```

FIG. 25A

## Continuation of HelloWorld.java

```
   public String toString() {
      return "A HelloWorld Object";
   }

   public String getGreeting() {
      return "Hello World!";
   }

   public int getID() {
      return 5;
   }

   public int getValue() {
      return value;
   }

/*{*/ // this function as in step 2 /*}*/
   public void setValue(int value) {
      // we only want to update and fire property change if really changes
      if (this.value != value) {
         int oldValue = this.value;
         this.value = value;
         // fire property change event to notify other XIS objects
         propertyChangeSupport.firePropertyChange("value", oldValue, value);
      }
   }

/*{*/
// "myColor"-related methods changed to expose "penColor" instead

   public Color getPenColor() {
      return myColor;
   }

   public void setPenColor(Color penColor) {
      // we only want to update and fire property change if really changes
      if (penColor != this.myColor) {
         Color oldPenColor = this.myColor;
         this.myColor = penColor;
         // fire property change event to notify other XIS objects
         propertyChangeSupport.firePropertyChange("penColor",
                                          oldPenColor, penColor);
      }
   }
```

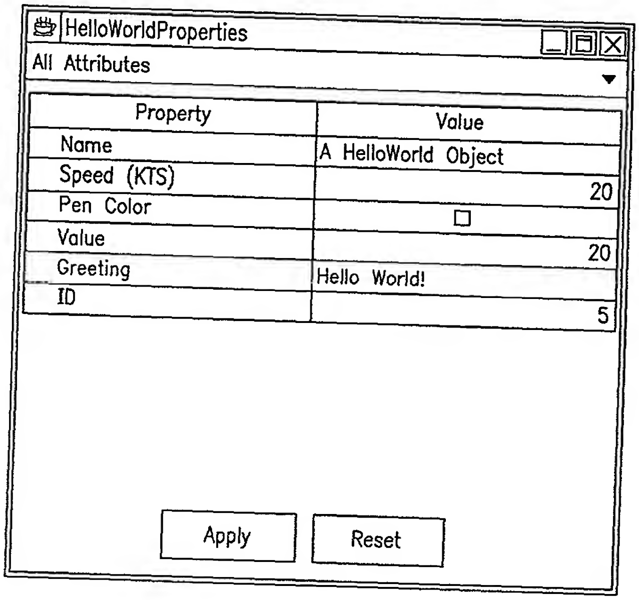
FIG. 25B

## Continuation of HelloWorld.java

```
    // expose toString() return under a new name
    public String getDisplayName() {
        return toString();
    }
  // expose "value" under a new name
    public double getSpeed() {
        return (double) getValue();
    }

  public void setSpeed(double speed) {
        // we only want to update and fire property change if really changes
        Double oldSpeed = new Double((double)this.getValue());
        if (speed != oldSpeed.doubleValue()) {
            setValue((int)speed);
            // fire property change event to notify other XIS objects
            propertyChangeSupport.firePropertyChange("speed", oldSpeed,
                                            new Double(speed));
        }
    }
  /*}*/

  /*{*/
    // store info about the fields, such as whether they are preferred or not
    private static FieldMetaData[] fieldMetaDataArray;

    // this method returns info on each field defined in the methods below
    public static FieldMetaData[] getFieldMetaDataArray() {

        if (fieldMetaDataArray == null) {
            // initialize default metadata
            FieldMetaData dispname = new
                        FieldMetaData(DisplayDomain.displayName);
            FieldMetaData pencolor = new
                        FieldMetaData(DisplayDomain.penColor);
            FieldMetaData speed = new
                        FieldMetaData(MovementDomain.speed);
            // could customize the field metadata here
            fieldMetaDataArray = new FieldMetaData[] {
                dispname, speed, pencolor
            };
        }
        return fieldMetaDataArray;
    }
  /*}*/
}
```

2506

FIG. 25C



| Property | Value |
|---|---|
| Name | A HelloWorld Object |
| Speed (KTS) | 20 |
| Pen Color | □ |
| Value | 20 |
| Greeting | Hello World! |
| ID | 5 |

FIG. 26

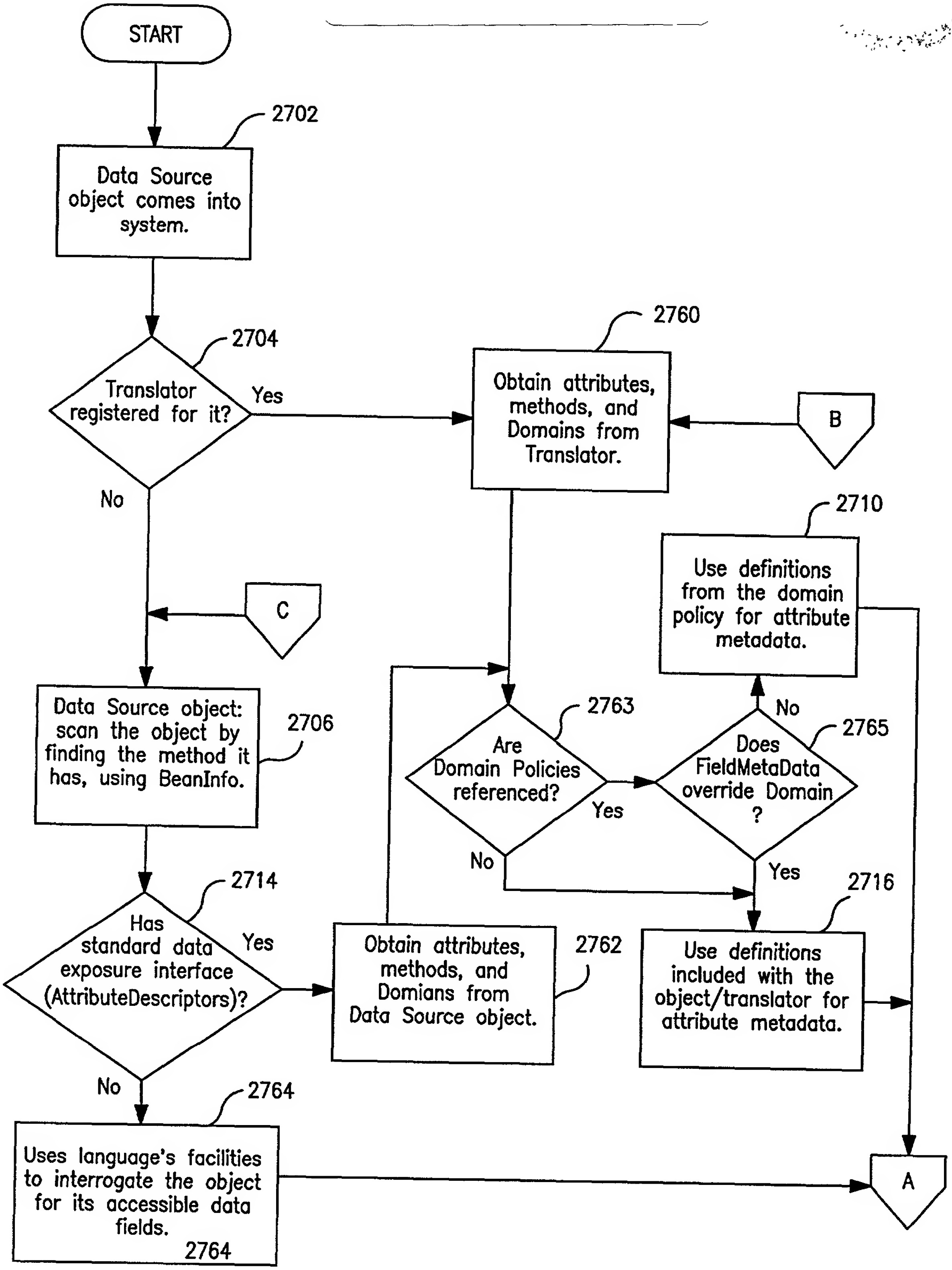

START
2702
Data Source object comes into system.
2704
Translator registered for it?
Yes
No
2760
Obtain attributes, methods, and Domains from Translator.
B
C
2710
Use definitions from the domain policy for attribute metadata.
Data Source object: scan the object by finding the method it has, using BeanInfo.
2706
2763
Are Domain Policies referenced?
Yes
No
No
2765
Does FieldMetaData override Domain ?
Yes
2716
2714
Has standard data exposure interface (AttributeDescriptors)?
Yes
Obtain attributes, methods, and Domians from Data Source object.
2762
Use definitions included with the object/translator for attribute metadata.
No
2764
Uses language's facilities to interrogate the object for its accessible data fields.
2764
A

FIG. 27A

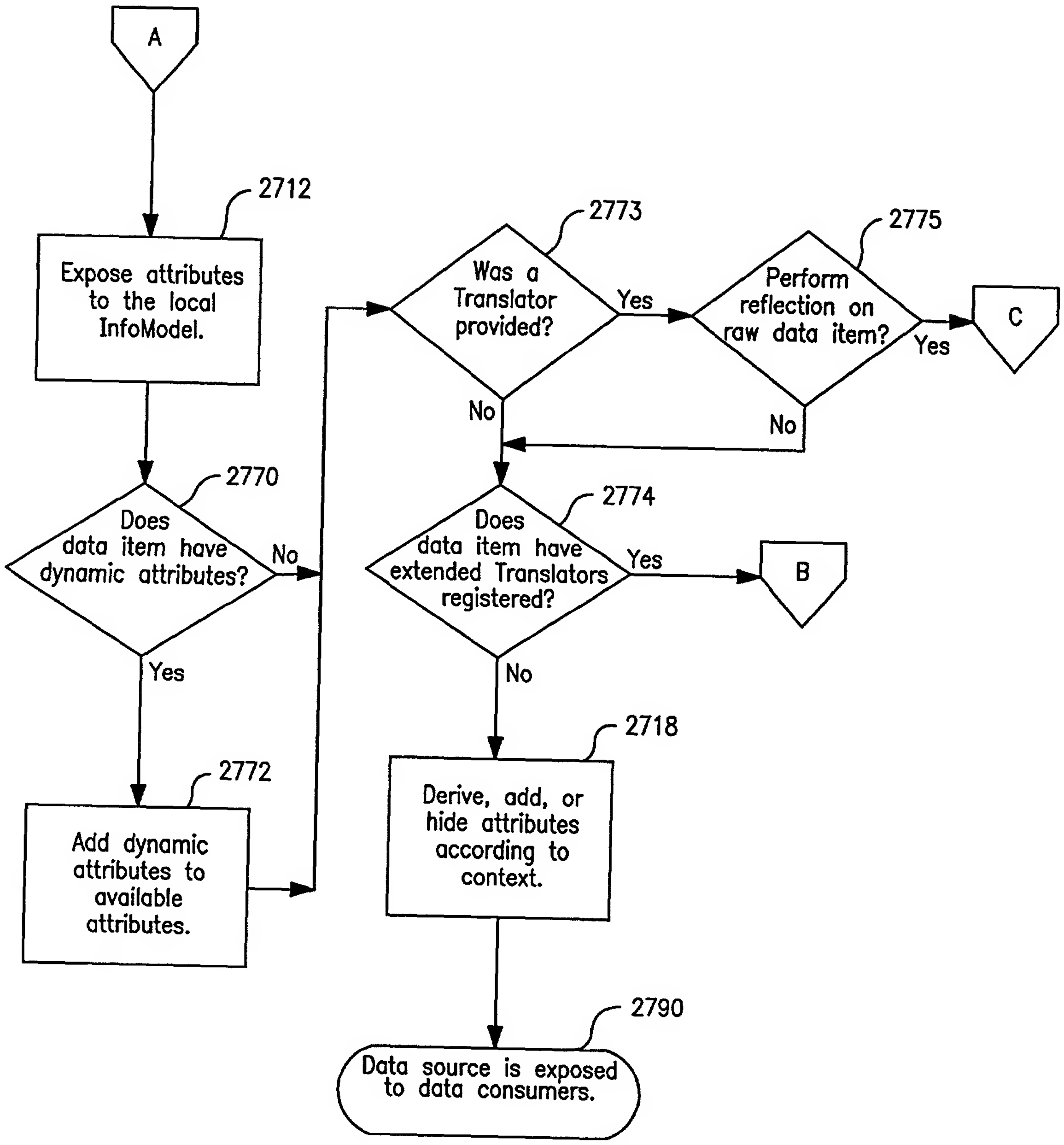

A
2712
Expose attributes to the local InfoModel.
2770
Does data item have dynamic attributes?
No
Yes
2772
Add dynamic attributes to available attributes.
2773
Was a Translator provided?
Yes
No
2775
Perform reflection on raw data item?
Yes
No
C
2774
Does data item have extended Translators registered?
Yes
No
B
2718
Derive, add, or hide attributes according to context.
2790
Data source is exposed to data consumers.

FIG. 27B

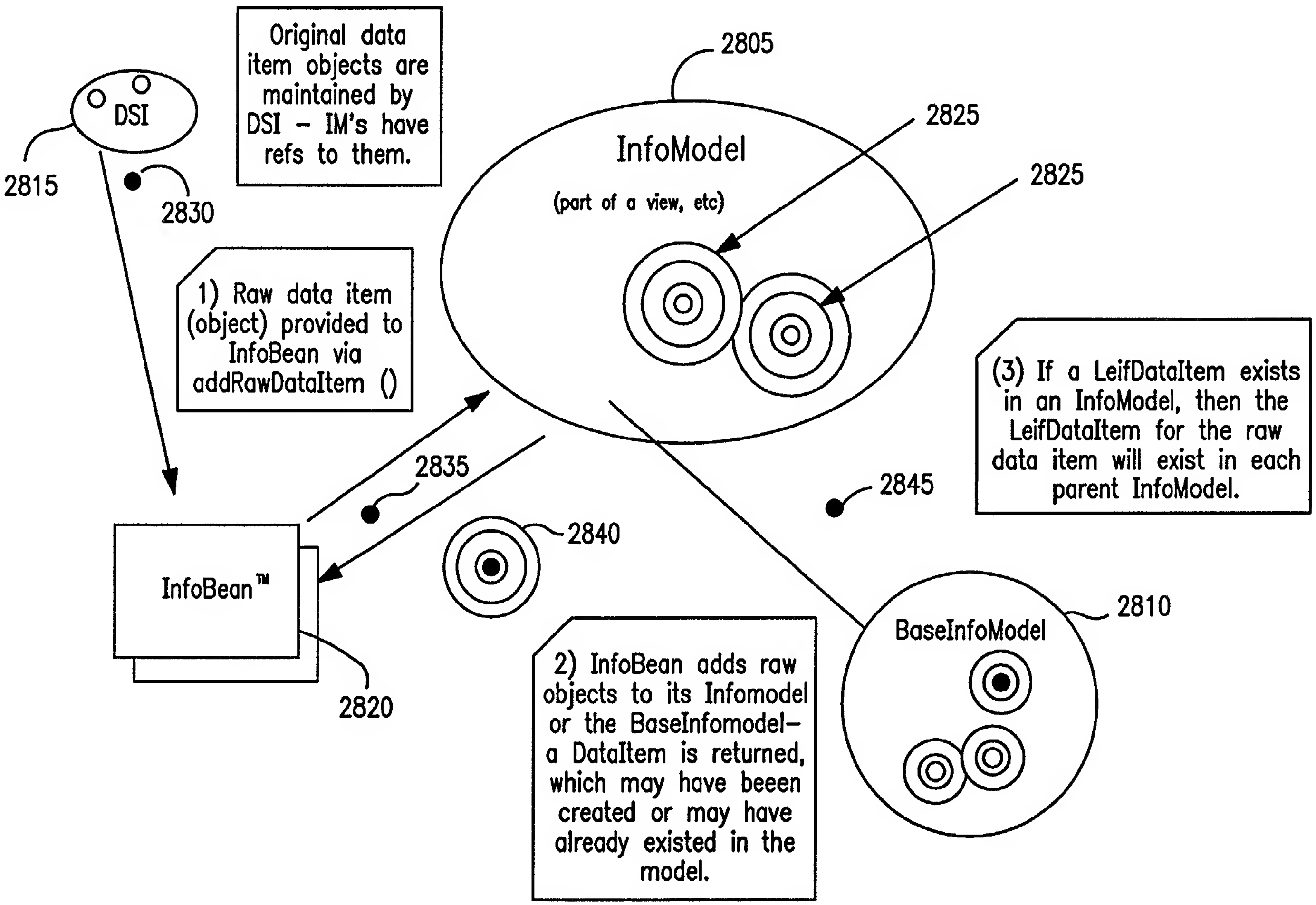

Original data item objects are maintained by DSI – IM's have refs to them.
DSI
2815
2830
1) Raw data item (object) provided to InfoBean via addRawDataItem ()
2805
InfoModel
(part of a view, etc)
2825
2825
InfoBean™
2820
2835
2840
2845
(3) If a LeifDataItem exists in an InfoModel, then the LeifDataItem for the raw data item will exist in each parent InfoModel.
2) InfoBean adds raw objects to its Infomodel or the BaseInfomodel– a DataItem is returned, which may have beeen created or may have already existed in the model.
BaseInfoModel
2810

FIG. 28

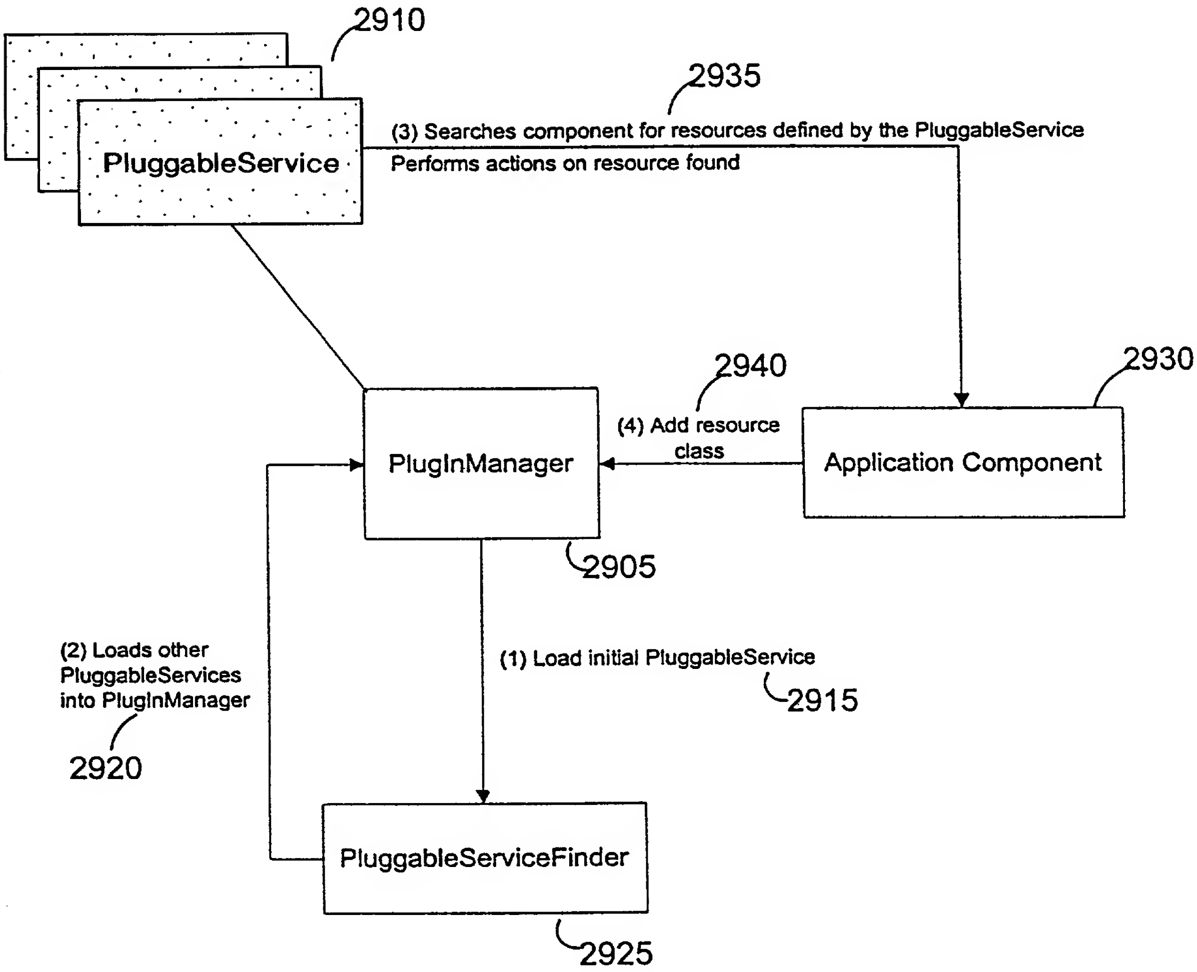

2910
PluggableService
2935
(3) Searches component for resources defined by the PluggableService
Performs actions on resource found
2940
2930
(4) Add resource class
PlugInManager
Application Component
2905
(1) Load initial PluggableService
2915
(2) Loads other PluggableServices into PlugInManager
2920
PluggableServiceFinder
2925

FIG. 29

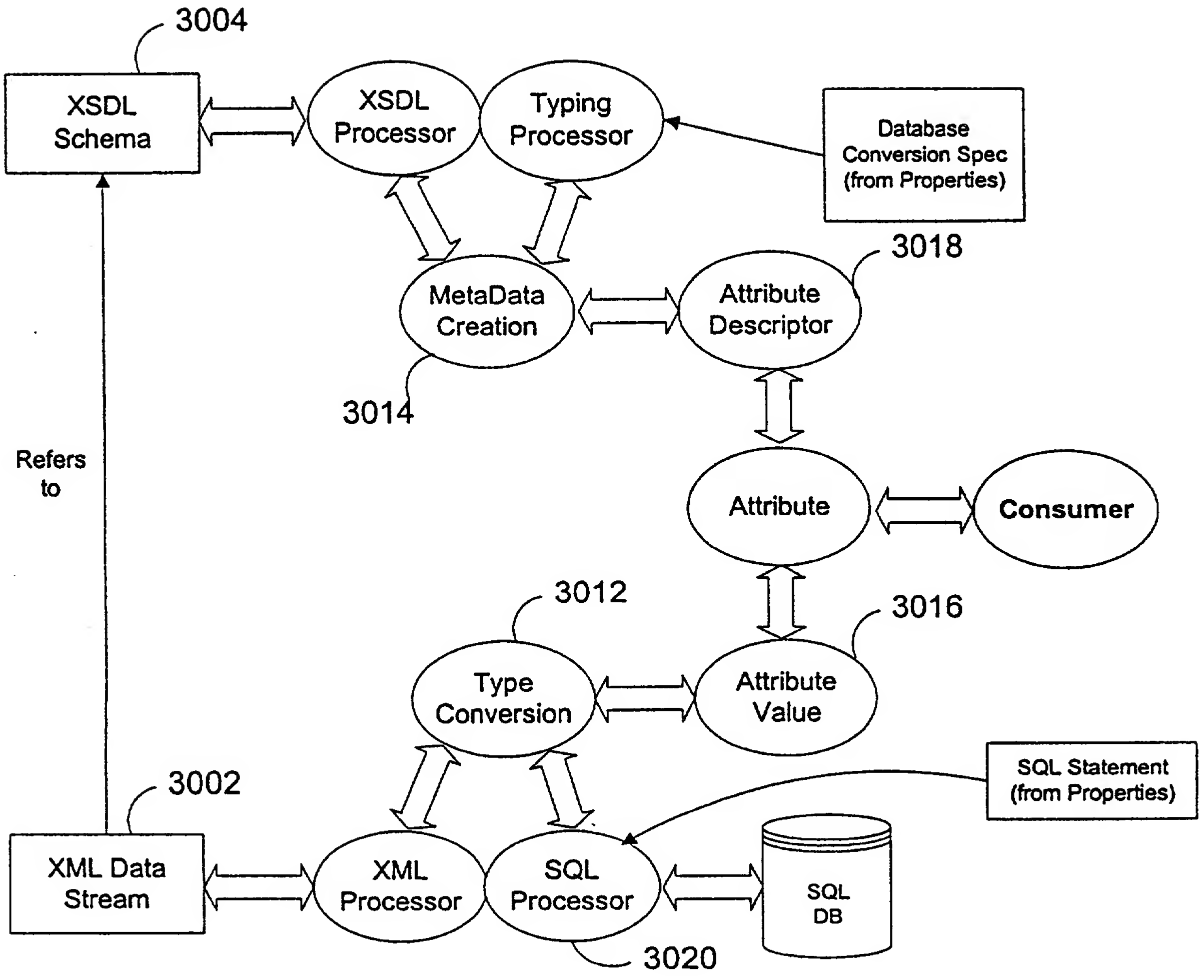
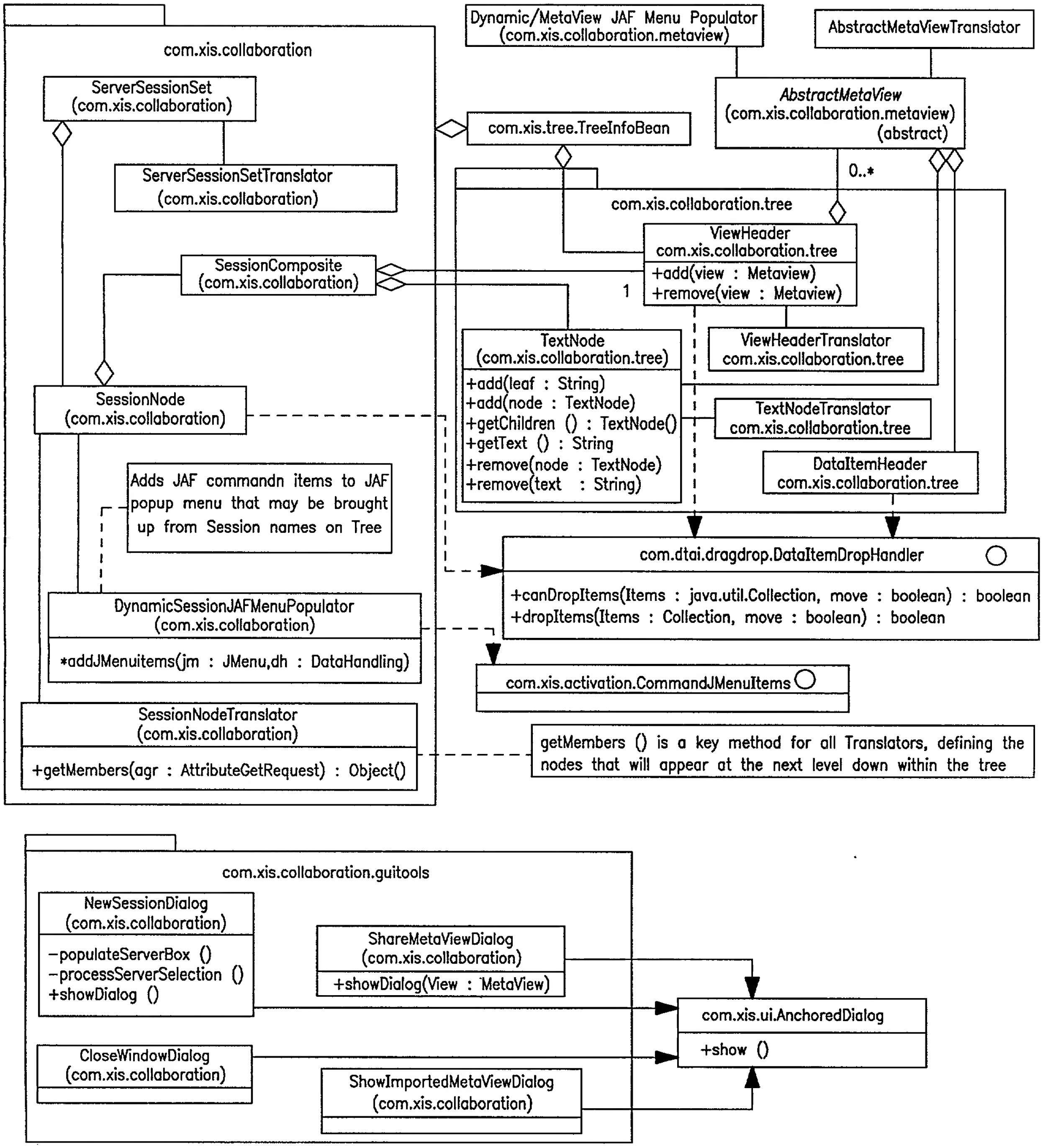

3004
XSDL Schema
XSDL Processor
Typing Processor
Database Conversion Spec (from Properties)
3018
MetaData Creation
Attribute Descriptor
3014
Refers to
Attribute
Consumer
3012
3016
Type Conversion
Attribute Value
3002
SQL Statement (from Properties)
XML Data Stream
XML Processor
SQL Processor
SQL DB
3020

FIG. 30


com.xis.collaboration
ServerSessionSet (com.xis.collaboration)
ServerSessionSetTranslator (com.xis.collaboration)
SessionComposite (com.xis.collaboration)
SessionNode (com.xis.collaboration)
DynamicSessionJAFMenuPopulator (com.xis.collaboration)
*addJMenuitems(jm : JMenu,dh : DataHandling)
SessionNodeTranslator (com.xis.collaboration)
+getMembers(agr : AttributeGetRequest) : Object()
Dynamic/MetaView JAF Menu Populator (com.xis.collaboration.metaview)
AbstractMetaViewTranslator
AbstractMetaView (com.xis.collaboration.metaview) (abstract)
com.xis.tree.TreeInfoBean
0..*
com.xis.collaboration.tree
ViewHeader com.xis.collaboration.tree
+add(view : Metaview)
+remove(view : Metaview)
1
TextNode (com.xis.collaboration.tree)
+add(leaf : String)
+add(node : TextNode)
+getChildren () : TextNode()
+getText () : String
+remove(node : TextNode)
+remove(text : String)
ViewHeaderTranslator com.xis.collaboration.tree
TextNodeTranslator com.xis.collaboration.tree
DataItemHeader com.xis.collaboration.tree
com.dtai.dragdrop.DataItemDropHandler
+canDropItems(Items : java.util.Collection, move : boolean) : boolean
+dropItems(Items : Collection, move : boolean) : boolean
com.xis.activation.CommandJMenuItems
com.xis.collaboration.guitools
NewSessionDialog (com.xis.collaboration)
-populateServerBox ()
-processServerSelection ()
+showDialog ()
ShareMetaViewDialog (com.xis.collaboration)
+showDialog(View : MetaView)
com.xis.ui.AnchoredDialog
+show ()
CloseWindowDialog (com.xis.collaboration)
ShowImportedMetaViewDialog (com.xis.collaboration)

Adds JAF commandn items to JAF popup menu that may be brought up from Session names on Tree

getMembers () is a key method for all Translators, defining the nodes that will appear at the next level down within the tree

FIG. 31

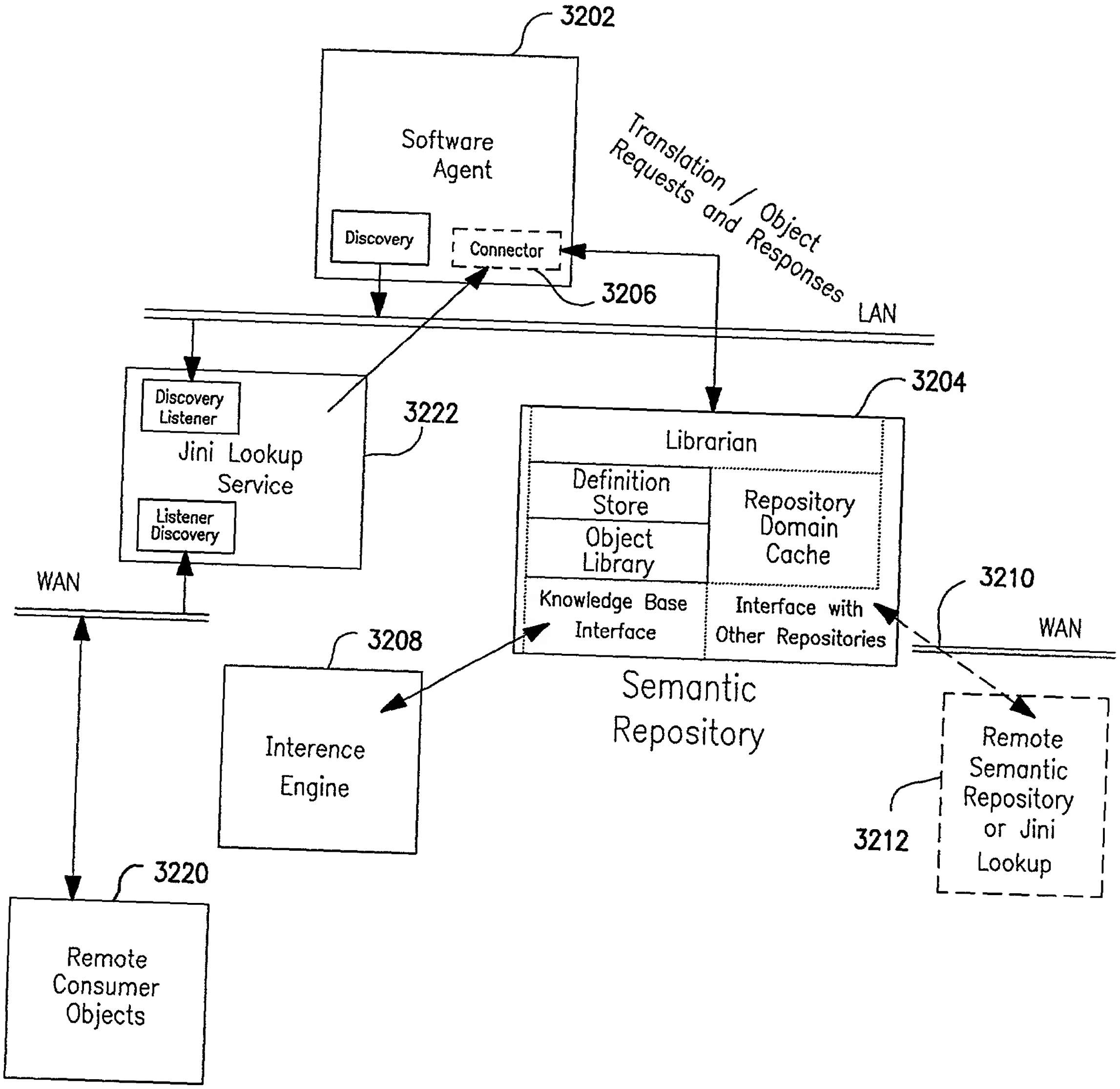
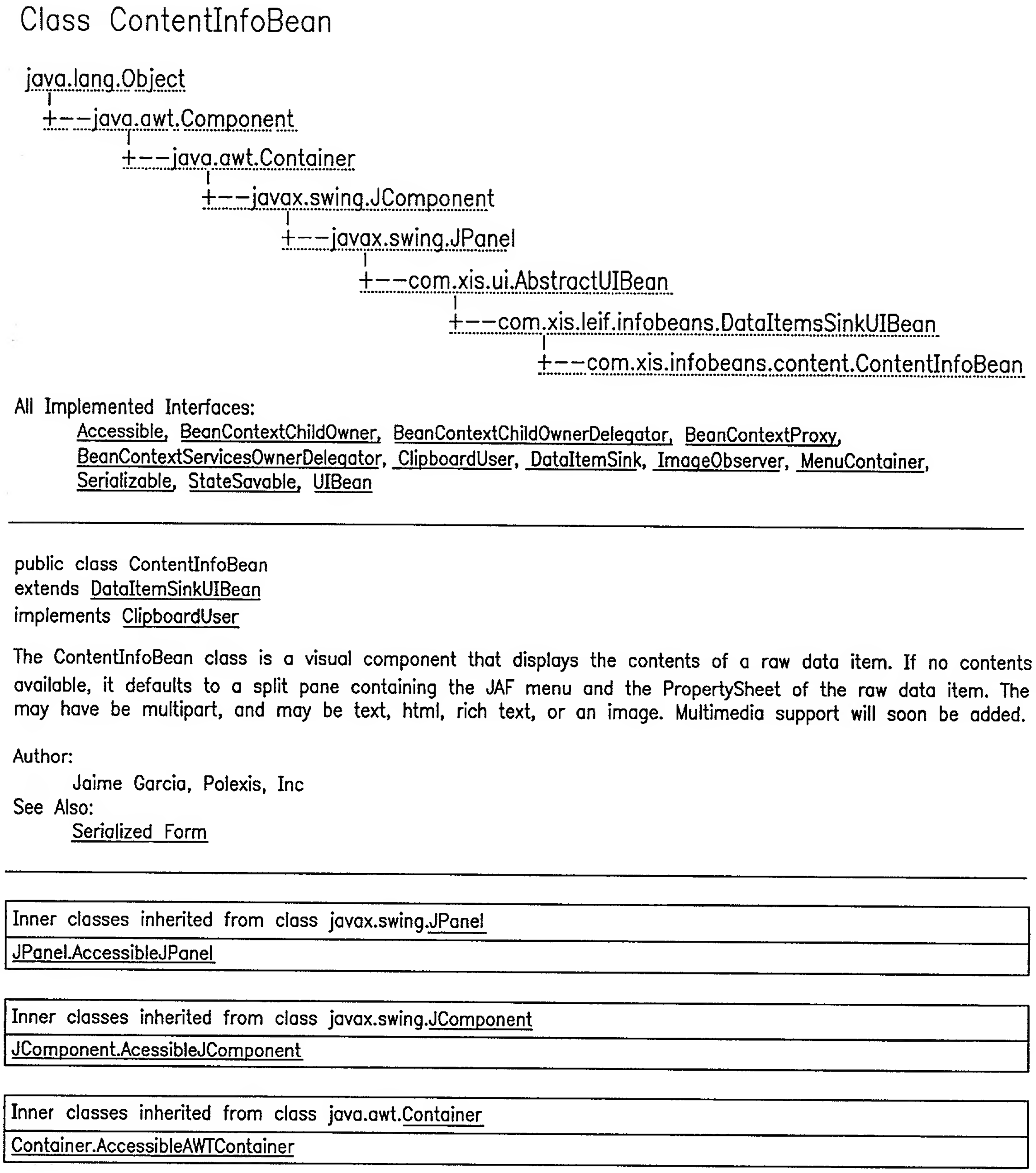

3202
Software Agent
Discovery
Connector
Translation / Object Requests and Responses
3206
LAN
Discovery Listener
Jini Lookup Service
Listener Discovery
3222
3204
Librarian
Definition Store
Object Library
Repository Domain Cache
Knowledge Base Interface
Interface with Other Repositories
3210
WAN
WAN
3208
Interence Engine
Semantic Repository
Remote Semantic Repository or Jini Lookup
3212
3220
Remote Consumer Objects

FIG. 32



## Class ContentInfoBean

```
java.lang.Object
  |
  +--java.awt.Component
        |
        +--java.awt.Container
              |
              +--javax.swing.JComponent
                    |
                    +--javax.swing.JPanel
                          |
                          +--com.xis.ui.AbstractUIBean
                                |
                                +--com.xis.leif.infobeans.DataItemsSinkUIBean
                                      |
                                      +--com.xis.infobeans.content.ContentInfoBean
```

All Implemented Interfaces:
Accessible, BeanContextChildOwner, BeanContextChildOwnerDelegator, BeanContextProxy, BeanContextServicesOwnerDelegator, ClipboardUser, DataItemSink, ImageObserver, MenuContainer, Serializable, StateSavable, UIBean

public class ContentInfoBean
extends DataItemSinkUIBean
implements ClipboardUser

The ContentInfoBean class is a visual component that displays the contents of a raw data item. If no contents are available, it defaults to a split pane containing the JAF menu and the PropertySheet of the raw data item. The contents may have be multipart, and may be text, html, rich text, or an image. Multimedia support will soon be added.

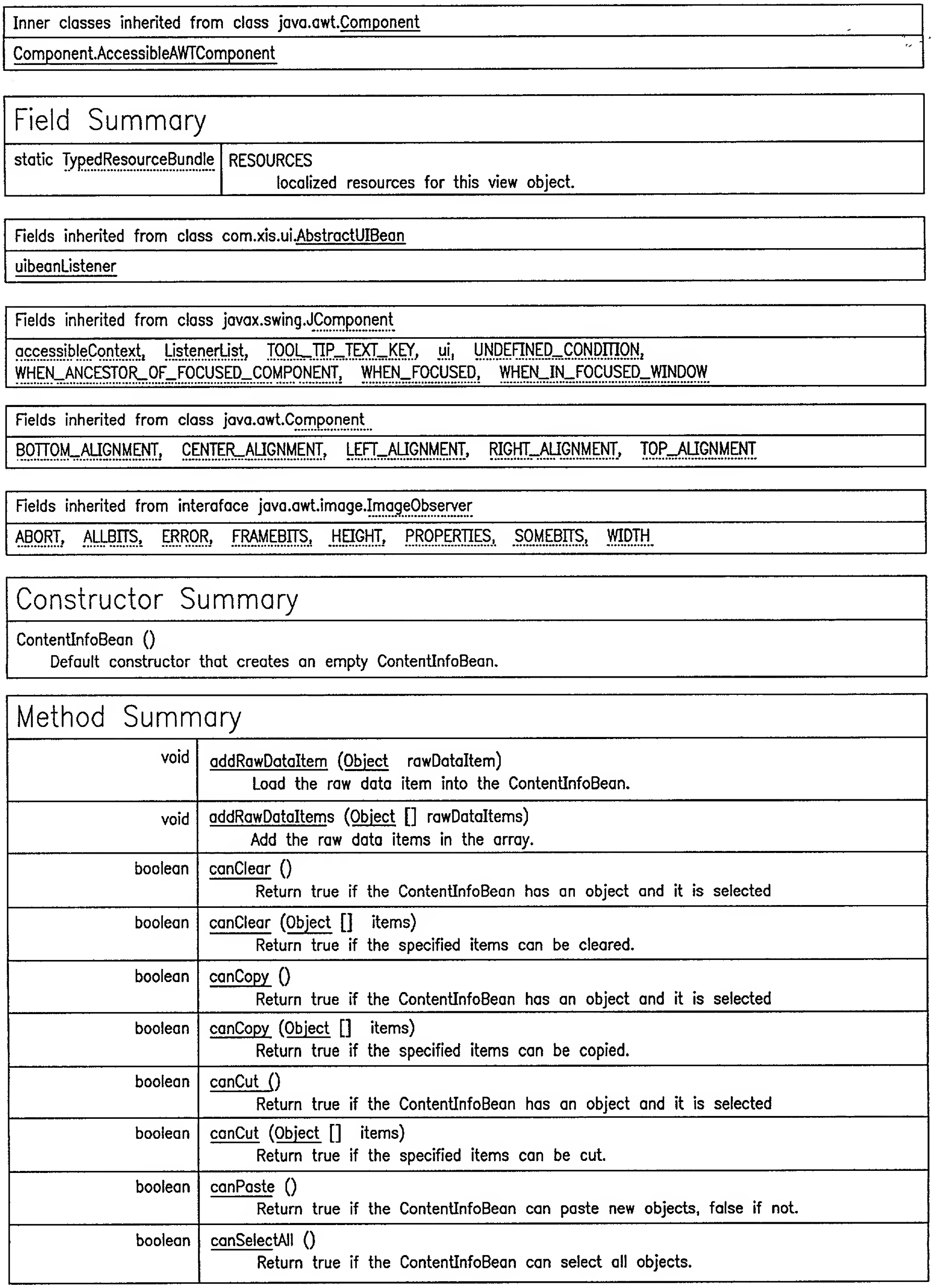
Author:
Jaime Garcia, Polexis, Inc
See Also:
Serialized Form

| Inner classes inherited from class javax.swing.JPanel |
|---|
| JPanel.AccessibleJPanel |

| Inner classes inherited from class javax.swing.JComponent |
|---|
| JComponent.AcessibleJComponent |

| Inner classes inherited from class java.awt.Container |
|---|
| Container.AccessibleAWTContainer |

FIG. 33A



| Inner classes inherited from class java.awt.Component |
|---|
| Component.AccessibleAWTComponent |

## Field Summary

| | |
|---|---|
| static TypedResourceBundle | RESOURCES<br>localized resources for this view object. |

| Fields inherited from class com.xis.ui.AbstractUIBean |
|---|
| uibeanListener |

| Fields inherited from class javax.swing.JComponent |
|---|
| accessibleContext, ListenerList, TOOL_TIP_TEXT_KEY, ui, UNDEFINED_CONDITION, WHEN_ANCESTOR_OF_FOCUSED_COMPONENT, WHEN_FOCUSED, WHEN_IN_FOCUSED_WINDOW |

| Fields inherited from class java.awt.Component |
|---|
| BOTTOM_ALIGNMENT, CENTER_ALIGNMENT, LEFT_ALIGNMENT, RIGHT_ALIGNMENT, TOP_ALIGNMENT |

| Fields inherited from interaface java.awt.image.ImageObserver |
|---|
| ABORT, ALLBITS, ERROR, FRAMEBITS, HEIGHT, PROPERTIES, SOMEBITS, WIDTH |

## Constructor Summary

ContentInfoBean ()
Default constructor that creates an empty ContentInfoBean.

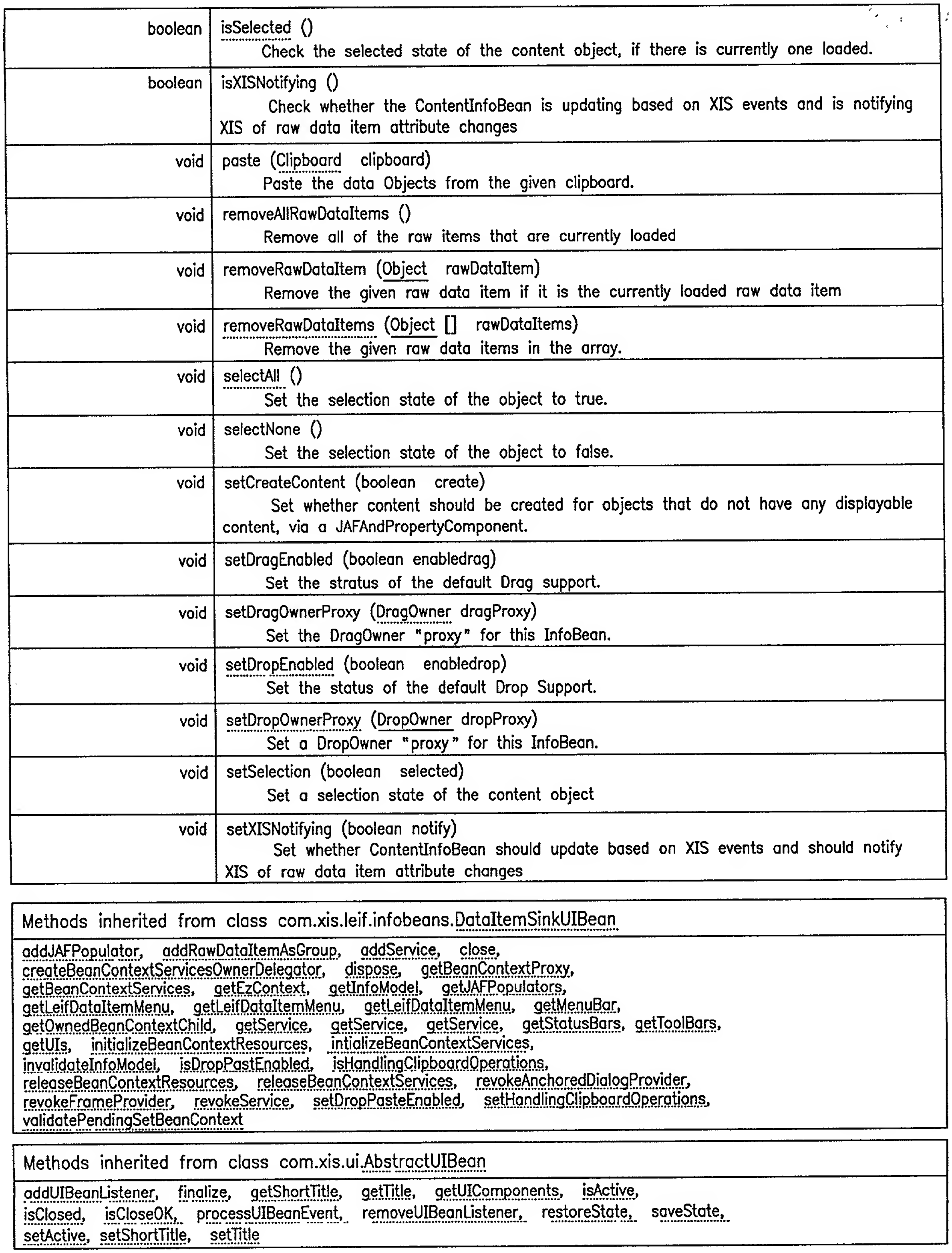
## Method Summary

| | |
|---|---|
| void | addRawDataItem (Object rawDataItem)<br>Load the raw data item into the ContentInfoBean. |
| void | addRawDataItems (Object [] rawDataItems)<br>Add the raw data items in the array. |
| boolean | canClear ()<br>Return true if the ContentInfoBean has an object and it is selected |
| boolean | canClear (Object [] items)<br>Return true if the specified items can be cleared. |
| boolean | canCopy ()<br>Return true if the ContentInfoBean has an object and it is selected |
| boolean | canCopy (Object [] items)<br>Return true if the specified items can be copied. |
| boolean | canCut ()<br>Return true if the ContentInfoBean has an object and it is selected |
| boolean | canCut (Object [] items)<br>Return true if the specified items can be cut. |
| boolean | canPaste ()<br>Return true if the ContentInfoBean can paste new objects, false if not. |
| boolean | canSelectAll ()<br>Return true if the ContentInfoBean can select all objects. |

FIG. 33B

| | |
|---|---|
| boolean | canSelectNone ()<br>Return true if the ContentInfoBean can un-select all objects. |
| void | clear ()<br>Notify the ContentInfoBean to remove the current raw data item only if it is selected. |
| void | clear (Object [] items)<br>Clears the given items. |
| void | clearAll ()<br>Removes the currently loaded object. |
| boolean | contains (Object [] items)<br>Return true if this ContentInfoBean contains *all* the objects of the given array. |
| boolean | containsComponent (Component component)<br>Check if the given component is contained by this InfoBean |
| void | copy (Clipboard clipboard)<br>Called to invoke this ContentInfoBean's copy action, which is to copy all selected data to the Clipboard. |
| void | copy (Clipboard clipboard, Object [] items)<br>Copies the given items into the Clipboard. |
| protected void | createContent ()<br>Method called when there is no content to display for a raw data item. |
| void | cut (Clipboard clipboard)<br>Cut selected items from the ContentInfoBean and post them into Clipboard. |
| void | cut (Clipboard clipboard, Object [] items)<br>Cut the given items from the ContentInfoBean and post them into the given Clipboard only if they occur in the ContentInfoBean. |
| protected Container | getContainerForContent ( int index)<br>Get a container with the contents of the content object at the given index, or null if the content type is not supported. |
| Object | getContents ()<br>Fetch the currently loaded raw data item |
| JAFAndPropertyComponent | getJAFAndPropertyComponent ()<br>Get the JAFAndProperty component used by the ContentInfoBean to display the contents for raw data items that have nothing else to display. |
| JMenu | getLeifDataItemMenu (LeifDataItem dataItem, boolean showCutPastItems)<br>Return the data item menu for a LeifDataItem (usually the selected LeifDataItem). |
| TypedResourceBundle | getResources ()<br>Return the ResourceBundle for this ContentInfoBean. |
| Object () | getSelectedObjects ()<br>Get an array of selcted objects. |
| Void | infoModelChanged ()<br>Messaged to indicate an InfoModel change for this InfoBean or one or more of its LeifDataItems. |
| boolean | isCreatingContent ()<br>Check whether default content creation is set. |
| boolean | isDragEnabled ()<br>Return true if the default Drag support is enabled. |
| boolean | isDropEnabled ()<br>Return true if the default Drop support is enabled. |

FIG. 33C

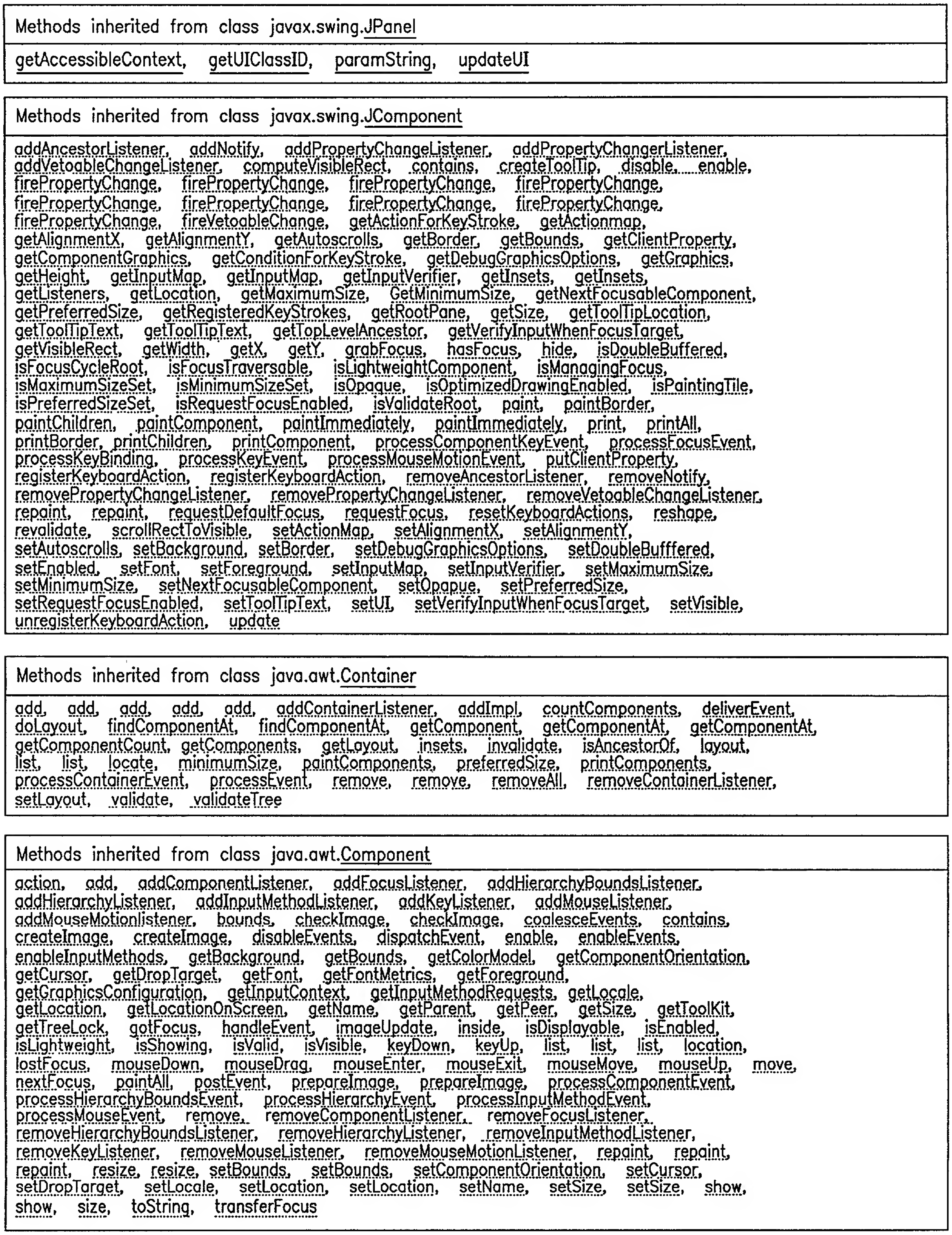


| | |
|---|---|
| boolean | isSelected ()<br>Check the selected state of the content object, if there is currently one loaded. |
| boolean | isXISNotifying ()<br>Check whether the ContentInfoBean is updating based on XIS events and is notifying XIS of raw data item attribute changes |
| void | paste (Clipboard clipboard)<br>Paste the data Objects from the given clipboard. |
| void | removeAllRawDataItems ()<br>Remove all of the raw items that are currently loaded |
| void | removeRawDataItem (Object rawDataItem)<br>Remove the given raw data item if it is the currently loaded raw data item |
| void | removeRawDataItems (Object [] rawDataItems)<br>Remove the given raw data items in the array. |
| void | selectAll ()<br>Set the selection state of the object to true. |
| void | selectNone ()<br>Set the selection state of the object to false. |
| void | setCreateContent (boolean create)<br>Set whether content should be created for objects that do not have any displayable content, via a JAFAndPropertyComponent. |
| void | setDragEnabled (boolean enabledrag)<br>Set the stratus of the default Drag support. |
| void | setDragOwnerProxy (DragOwner dragProxy)<br>Set the DragOwner "proxy" for this InfoBean. |
| void | setDropEnabled (boolean enabledrop)<br>Set the status of the default Drop Support. |
| void | setDropOwnerProxy (DropOwner dropProxy)<br>Set a DropOwner "proxy" for this InfoBean. |
| void | setSelection (boolean selected)<br>Set a selection state of the content object |
| void | setXISNotifying (boolean notify)<br>Set whether ContentInfoBean should update based on XIS events and should notify XIS of raw data item attribute changes |

| Methods inherited from class com.xis.leif.infobeans.DataItemSinkUIBean |
|---|
| addJAFPopulator, addRawDataItemAsGroup, addService, close, createBeanContextServicesOwnerDelegator, dispose, getBeanContextProxy, getBeanContextServices, getEzContext, getInfoModel, getJAFPopulators, getLeifDataItemMenu, getLeifDataItemMenu, getLeifDataItemMenu, getMenuBar, getOwnedBeanContextChild, getService, getService, getService, getStatusBars, getToolBars, getUIs, initializeBeanContextResources, intializeBeanContextServices, invalidateInfoModel, isDropPastEnabled, isHandlingClipboardOperations, releaseBeanContextResources, releaseBeanContextServices, revokeAnchoredDialogProvider, revokeFrameProvider, revokeService, setDropPasteEnabled, setHandlingClipboardOperations, validatePendingSetBeanContext |

| Methods inherited from class com.xis.ui.AbstractUIBean |
|---|
| addUIBeanListener, finalize, getShortTitle, getTitle, getUIComponents, isActive, isClosed, isCloseOK, processUIBeanEvent, removeUIBeanListener, restoreState, saveState, setActive, setShortTitle, setTitle |

FIG. 33D



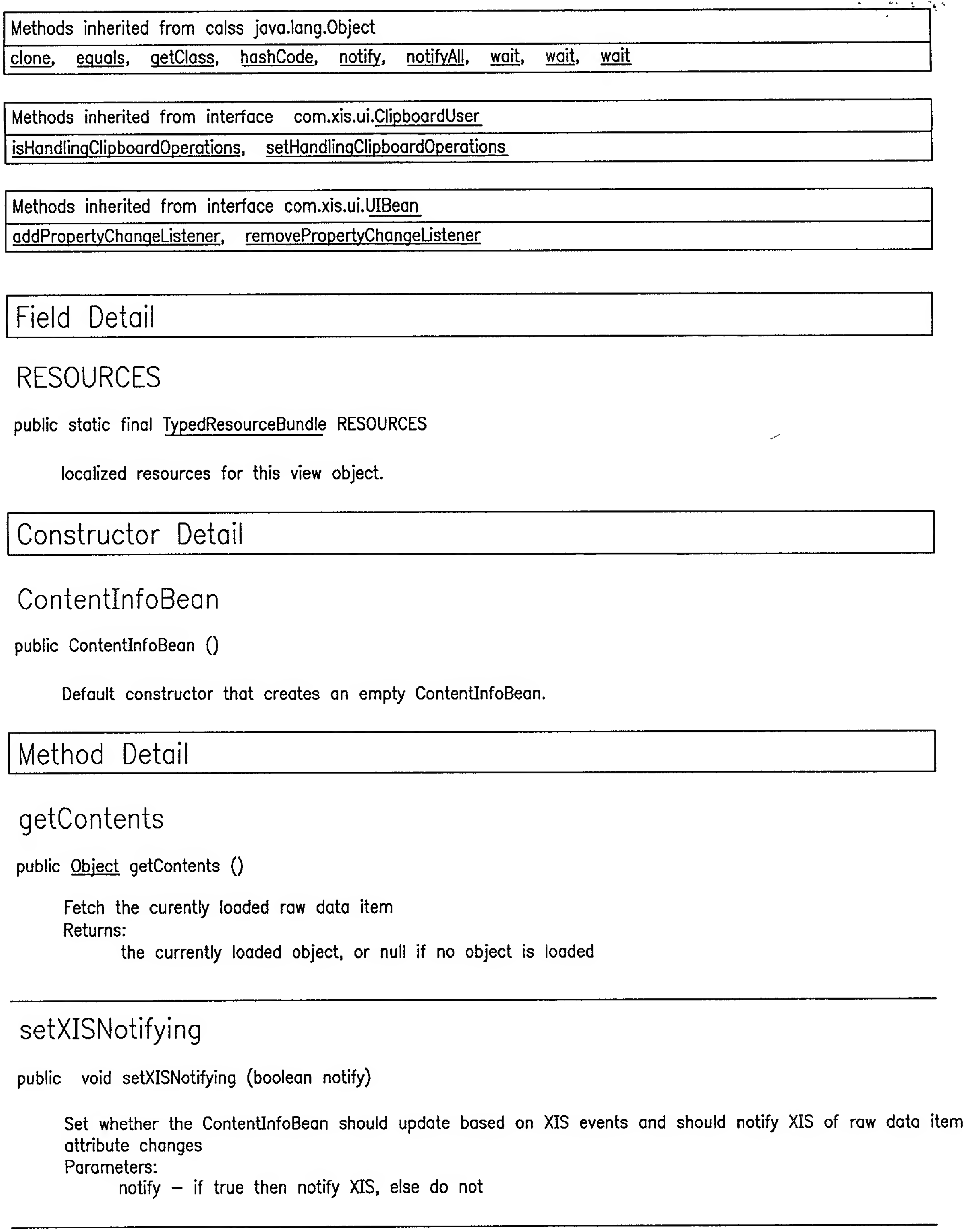
| Methods inherited from class javax.swing.JPanel |
|---|
| getAccessibleContext, getUIClassID, paramString, updateUI |

| Methods inherited from class javax.swing.JComponent |
|---|
| addAncestorListener, addNotify, addPropertyChangeListener, addPropertyChangerListener, addVetoableChangeListener, computeVisibleRect, contains, createToolTip, disable, enable, firePropertyChange, firePropertyChange, firePropertyChange, firePropertyChange, firePropertyChange, firePropertyChange, firePropertyChange, firePropertyChange, firePropertyChange, fireVetoableChange, getActionForKeyStroke, getActionmap, getAlignmentX, getAlignmentY, getAutoscrolls, getBorder, getBounds, getClientProperty, getComponentGraphics, getConditionForKeyStroke, getDebugGraphicsOptions, getGraphics, getHeight, getInputMap, getInputMap, getInputVerifier, getInsets, getInsets, getListeners, getLocation, getMaximumSize, GetMinimumSize, getNextFocusableComponent, getPreferredSize, getRegisteredKeyStrokes, getRootPane, getSize, getToolTipLocation, getToolTipText, getToolTipText, getTopLevelAncestor, getVerifyInputWhenFocusTarget, getVisibleRect, getWidth, getX, getY, grabFocus, hasFocus, hide, isDoubleBuffered, isFocusCycleRoot, isFocusTraversable, isLightweightComponent, isManagingFocus, isMaximumSizeSet, isMinimumSizeSet, isOpaque, isOptimizedDrawingEnabled, isPaintingTile, isPreferredSizeSet, isRequestFocusEnabled, isValidateRoot, paint, paintBorder, paintChildren, paintComponent, paintImmediately, paintImmediately, print, printAll, printBorder, printChildren, printComponent, processComponentKeyEvent, processFocusEvent, processKeyBinding, processKeyEvent, processMouseMotionEvent, putClientProperty, registerKeyboardAction, registerKeyboardAction, removeAncestorListener, removeNotify, removePropertyChangeListener, removePropertyChangeListener, removeVetoableChangeListener, repaint, repaint, requestDefaultFocus, requestFocus, resetKeyboardActions, reshape, revalidate, scrollRectToVisible, setActionMap, setAlignmentX, setAlignmentY, setAutoscrolls, setBackground, setBorder, setDebugGraphicsOptions, setDoubleBufffered, setEnabled, setFont, setForeground, setInputMap, setInputVerifier, setMaximumSize, setMinimumSize, setNextFocusableComponent, setOpapue, setPreferredSize, setRequestFocusEnabled, setToolTipText, setUI, setVerifyInputWhenFocusTarget, setVisible, unregisterKeyboardAction, update |

| Methods inherited from class java.awt.Container |
|---|
| add, add, add, add, add, addContainerListener, addImpl, countComponents, deliverEvent, doLayout, findComponentAt, findComponentAt, getComponent, getComponentAt, getComponentAt, getComponentCount, getComponents, getLayout, insets, invalidate, isAncestorOf, layout, list, list, locate, minimumSize, paintComponents, preferredSize, printComponents, processContainerEvent, processEvent, remove, remove, removeAll, removeContainerListener, setLayout, validate, validateTree |

| Methods inherited from class java.awt.Component |
|---|
| action, add, addComponentListener, addFocusListener, addHierarchyBoundsListener, addHierarchyListener, addInputMethodListener, addKeyListener, addMouseListener, addMouseMotionlistener, bounds, checkImage, checkImage, coalesceEvents, contains, createImage, createImage, disableEvents, dispatchEvent, enable, enableEvents, enableInputMethods, getBackground, getBounds, getColorModel, getComponentOrientation, getCursor, getDropTarget, getFont, getFontMetrics, getForeground, getGraphicsConfiguration, getInputContext, getInputMethodRequests, getLocale, getLocation, getLocationOnScreen, getName, getParent, getPeer, getSize, getToolKit, getTreeLock, gotFocus, handleEvent, imageUpdate, inside, isDisplayable, isEnabled, isLightweight, isShowing, isValid, isVisible, keyDown, keyUp, list, list, list, location, lostFocus, mouseDown, mouseDrag, mouseEnter, mouseExit, mouseMove, mouseUp, move, nextFocus, paintAll, postEvent, prepareImage, prepareImage, processComponentEvent, processHierarchyBoundsEvent, processHierarchyEvent, processInputMethodEvent, processMouseEvent, remove, removeComponentListener, removeFocusListener, removeHierarchyBoundsListener, removeHierarchyListener, removeInputMethodListener, removeKeyListener, removeMouseListener, removeMouseMotionListener, repaint, repaint, repaint, resize, resize, setBounds, setBounds, setComponentOrientation, setCursor, setDropTarget, setLocale, setLocation, setLocation, setName, setSize, setSize, show, show, size, toString, transferFocus |

FIG. 33E



| Methods inherited from calss java.lang.Object |
|---|
| clone, equals, getClass, hashCode, notify, notifyAll, wait, wait, wait |

| Methods inherited from interface com.xis.ui.ClipboardUser |
|---|
| isHandlingClipboardOperations, setHandlingClipboardOperations |

| Methods inherited from interface com.xis.ui.UIBean |
|---|
| addPropertyChangeListener, removePropertyChangeListener |

## Field Detail

### RESOURCES

public static final TypedResourceBundle RESOURCES

localized resources for this view object.

## Constructor Detail

### ContentInfoBean

public ContentInfoBean ()

Default constructor that creates an empty ContentInfoBean.

## Method Detail

### getContents

public Object getContents ()

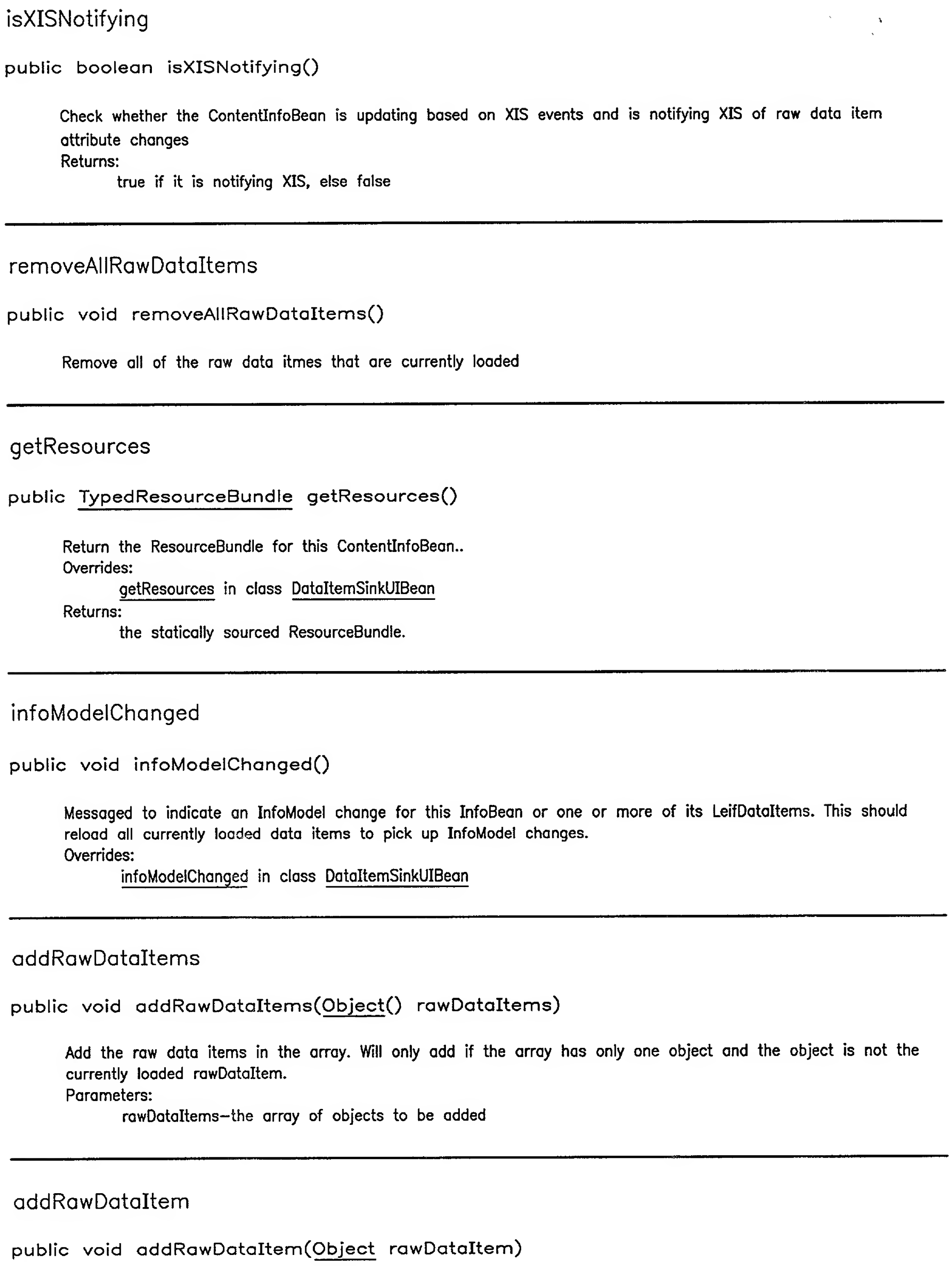
Fetch the curently loaded raw data item
Returns:
the currently loaded object, or null if no object is loaded

### setXISNotifying

public void setXISNotifying (boolean notify)

Set whether the ContentInfoBean should update based on XIS events and should notify XIS of raw data item attribute changes
Parameters:
notify – if true then notify XIS, else do not

FIG. 33F



isXISNotifying

public boolean isXISNotifying()

Check whether the ContentInfoBean is updating based on XIS events and is notifying XIS of raw data item attribute changes
Returns:
true if it is notifying XIS, else false

removeAllRawDataItems

public void removeAllRawDataItems()

Remove all of the raw data itmes that are currently loaded

getResources

public TypedResourceBundle getResources()

Return the ResourceBundle for this ContentInfoBean..
Overrides:
getResources in class DataItemSinkUIBean
Returns:
the statically sourced ResourceBundle.

infoModelChanged

public void infoModelChanged()

Messaged to indicate an InfoModel change for this InfoBean or one or more of its LeifDataItems. This should reload all currently loaded data items to pick up InfoModel changes.
Overrides:
infoModelChanged in class DataItemSinkUIBean

addRawDataItems

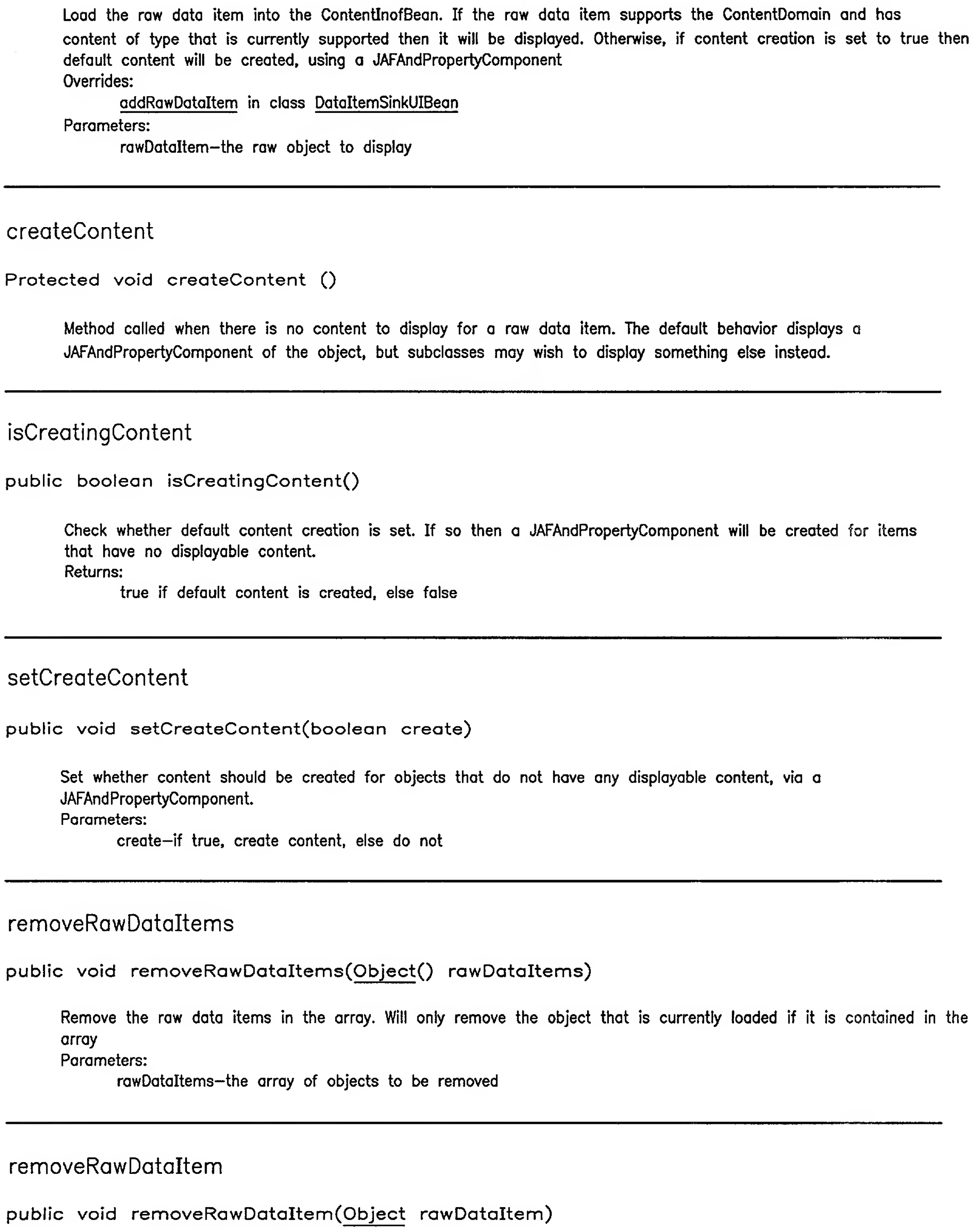
public void addRawDataItems(Object() rawDataItems)

Add the raw data items in the array. Will only add if the array has only one object and the object is not the currently loaded rawDataItem.
Parameters:
rawDataItems–the array of objects to be added

addRawDataItem

public void addRawDataItem(Object rawDataItem)

FIG. 33G



Load the raw data item into the ContentInofBean. If the raw data item supports the ContentDomain and has content of type that is currently supported then it will be displayed. Otherwise, if content creation is set to true then default content will be created, using a JAFAndPropertyComponent

Overrides:

addRawDataItem in class DataItemSinkUIBean

Parameters:

rawDataItem—the raw object to display

## createContent

```
Protected void createContent ()
```

Method called when there is no content to display for a raw data item. The default behavior displays a JAFAndPropertyComponent of the object, but subclasses may wish to display something else instead.

## isCreatingContent

```
public boolean isCreatingContent()
```

Check whether default content creation is set. If so then a JAFAndPropertyComponent will be created for items that have no displayable content.

Returns:

true if default content is created, else false

## setCreateContent

```
public void setCreateContent(boolean create)
```

Set whether content should be created for objects that do not have any displayable content, via a JAFAndPropertyComponent.

Parameters:

create—if true, create content, else do not

## removeRawDataItems

```
public void removeRawDataItems(Object() rawDataItems)
```

Remove the raw data items in the array. Will only remove the object that is currently loaded if it is contained in the array

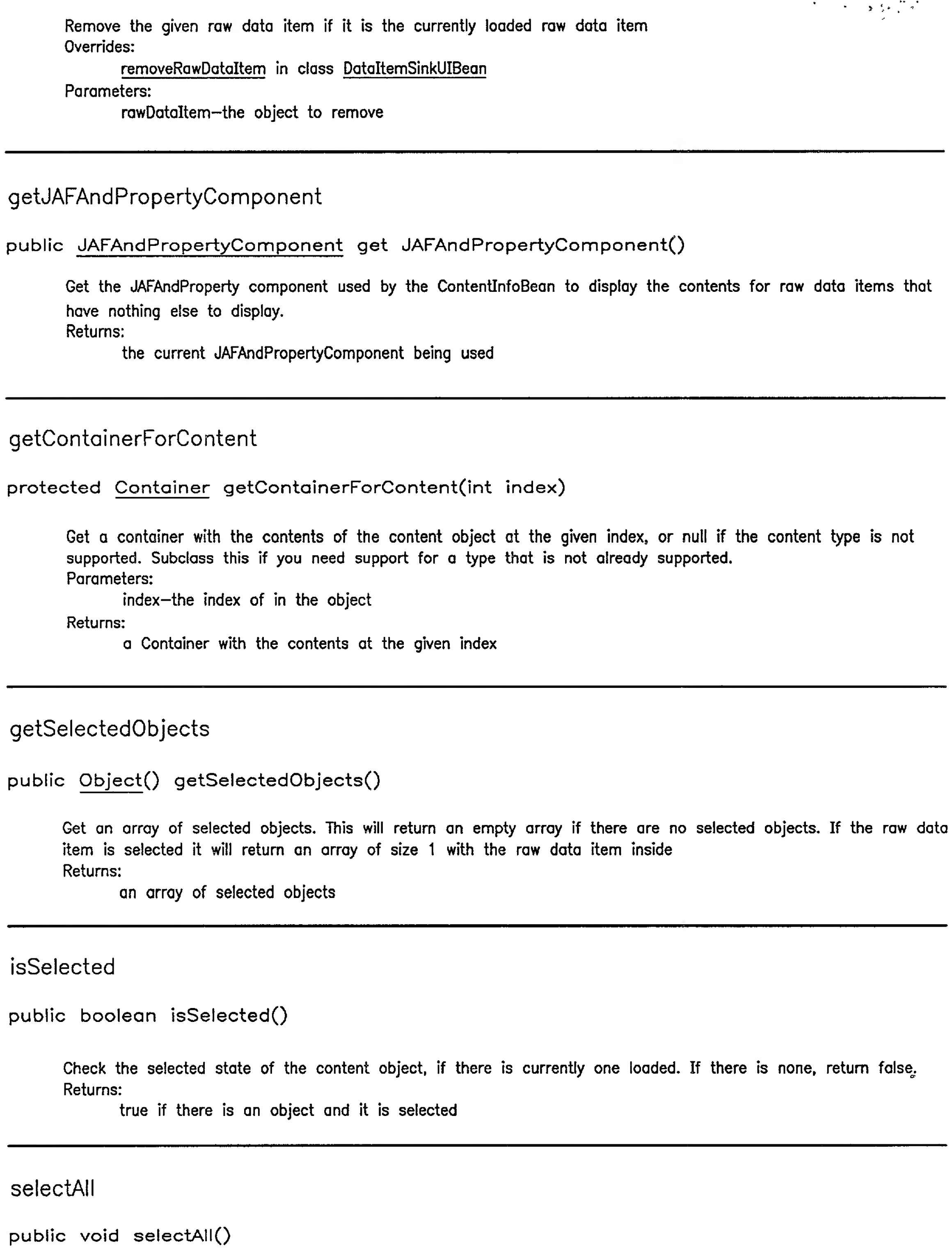
Parameters:

rawDataItems—the array of objects to be removed

## removeRawDataItem

```
public void removeRawDataItem(Object rawDataItem)
```

FIG. 33H



Remove the given raw data item if it is the currently loaded raw data item
Overrides:
removeRawDataItem in class DataItemSinkUIBean
Parameters:
rawDataItem—the object to remove

## getJAFAndPropertyComponent

public JAFAndPropertyComponent get JAFAndPropertyComponent()

Get the JAFAndProperty component used by the ContentInfoBean to display the contents for raw data items that have nothing else to display.
Returns:
the current JAFAndPropertyComponent being used

## getContainerForContent

protected Container getContainerForContent(int index)

Get a container with the contents of the content object at the given index, or null if the content type is not supported. Subclass this if you need support for a type that is not already supported.
Parameters:
index—the index of in the object
Returns:
a Container with the contents at the given index

## getSelectedObjects

public Object() getSelectedObjects()

Get an array of selected objects. This will return an empty array if there are no selected objects. If the raw data item is selected it will return an array of size 1 with the raw data item inside
Returns:
an array of selected objects

## isSelected

public boolean isSelected()

Check the selected state of the content object, if there is currently one loaded. If there is none, return false.
Returns:
true if there is an object and it is selected

## selectAll

public void selectAll()

FIG. 33I

Set the selection state of the object to true.
Specified by:
selectAll in interface ClipboardUser
Overrides:
selectAll in class DataItemSinkUIBean

---

## selectNone

public void selectNone()

Set the selection state of the object to false.

---

## setSelection

public void setSelection(boolean selected)

Set the selection state of the content object
Parameters:
the-new selection state

---

## canClear

public boolean canClear()

Return true if the ContentInfoBean has an object and it is selected
Specified by:
canClear in interface ClipboardUser
Overrides:
canClear in class DataItemSinkUIBean
Returns:
true if the raw data item is selected
See Also:
getSelectedObjects()

---

## canClear

public boolean canClear(Object() items)

Return true if the specified items can be cleared. If the item is not in the ContentInfoBean return false. If there is more than one item return false.
Specified by:
canClear in interface ClipboardUser
Overrides:
canClear in class DataItemSinkUIBean
Parameters:
items—the Array of items to be cut.
Returns:
true if all of the items are present, otherwise false
See Also:

FIG. 33J

contains(Object [] )

## canCopy

public boolean canCopy()

Return true if the ContentInfoBean has an object and it is selected

Specified by:
canCopy in interface ClipboardUser

Overrides:
canCopy in class DataItemSinkUIBean

Returns:
true if the raw data item is selected

See Also:
canClear ()

## canCopy

public boolean canCopy(Object[] items)

Return true if the specified items can be copied. If the item is not in the ContentInfoBean return false. If there is more than one item return false.

Specified by:
canCopy in interface ClipboardUser

Overrides:
canCopy in class DataItemSinkUIBean

Parameters:
items-the Array of itmes to be cut.

Returns:
true if all of the items are present, otherwise false

See Also:
canClear(Object [] )

## canCut

public boolean canCut()

Return true if the ContentInfoBean has an object and it is selected

Specified by:
canCut in interface ClipboardUser

Overrides:
canCut in class DataItemSinkUIBean

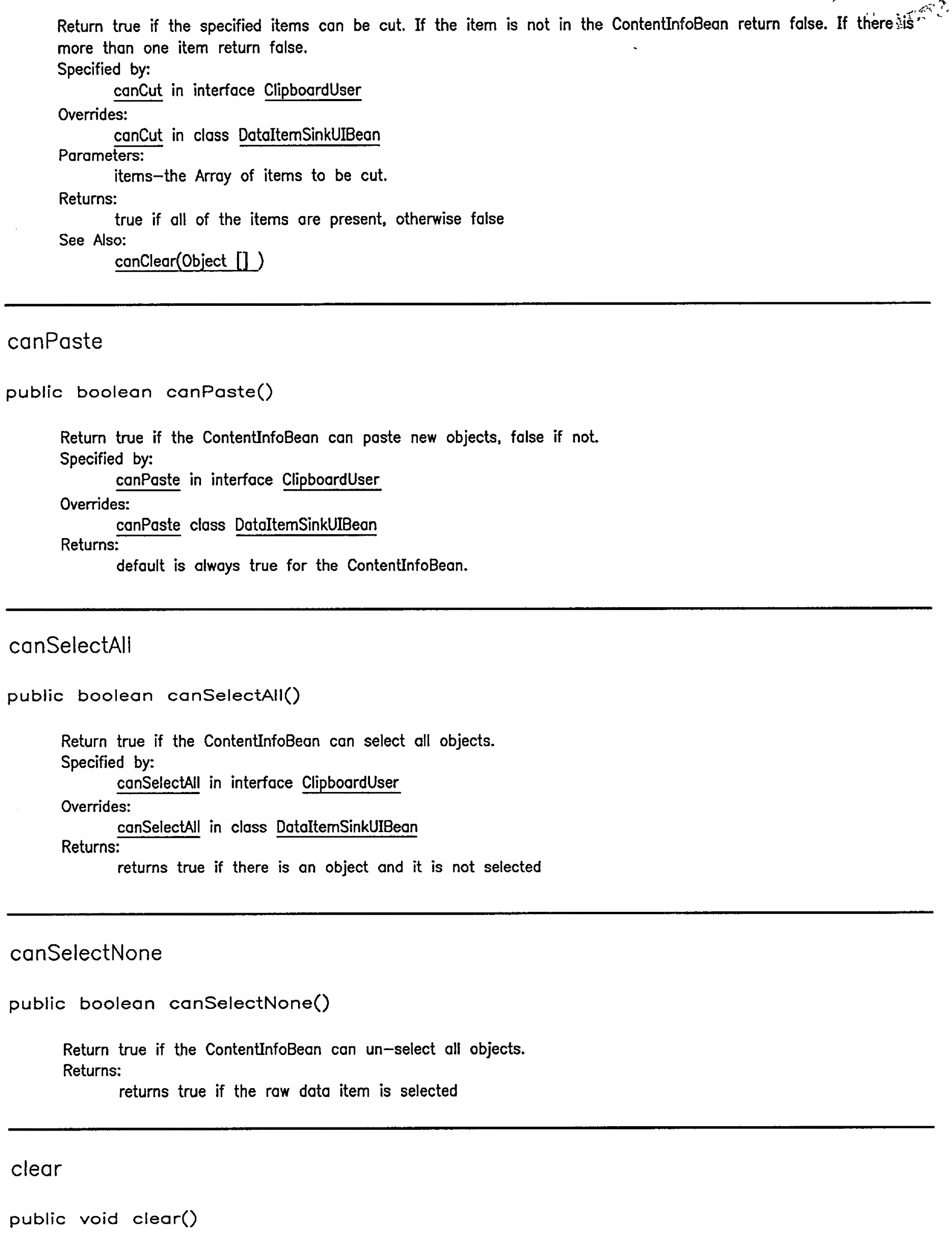
Returns:
true if the raw data item is selected

See Also:
canClear()

## canCut

public boolean canCut(Object [] items)

FIG. 33K



Return true if the specified items can be cut. If the item is not in the ContentInfoBean return false. If there is more than one item return false.

Specified by:
  canCut in interface ClipboardUser
Overrides:
  canCut in class DataItemSinkUIBean
Parameters:
  items–the Array of items to be cut.
Returns:
  true if all of the items are present, otherwise false
See Also:
  canClear(Object [] )

## canPaste

```
public boolean canPaste()
```

Return true if the ContentInfoBean can paste new objects, false if not.
Specified by:
  canPaste in interface ClipboardUser
Overrides:
  canPaste class DataItemSinkUIBean
Returns:
  default is always true for the ContentInfoBean.

## canSelectAll

```
public boolean canSelectAll()
```

Return true if the ContentInfoBean can select all objects.
Specified by:
  canSelectAll in interface ClipboardUser
Overrides:
  canSelectAll in class DataItemSinkUIBean
Returns:
  returns true if there is an object and it is not selected

## canSelectNone

```
public boolean canSelectNone()
```

Return true if the ContentInfoBean can un–select all objects.
Returns:
  returns true if the raw data item is selected

## clear

```
public void clear()
```

FIG. 33L

Notify the ContentInfoBean to remove the current raw data item only if it is selected.
Specified by:
    clear in interface ClipboardUser
Overrides:
    clear in class DataItemSinkUIBean

## clear

```
public void clear(Object [] items)
```

Clears the given items. These items only get cleared if they actually occur in the ContentInfoBean.
Specified by:
    clear in interface ClipboardUser
Overrides:
    clear in class DataItemSinkUIBean
Parameters:
    items—the items to cleared

## clearAll

```
public void clearAll()
```

Removes the currently loaded object.

## copy

```
public void copy(Clipboard clipboard)
```

Called to invoke theis ContentInfoBean's copy action, which is to copy all selected data to the Clipboard.
Specified by:
    copy in interface ClipboardUser
Overrides:
    copy in class DataItemSinkUIBean
Parameters:
    clipboard—the Clipboard object that gets posted to. The actual items posted are contained in a LeifTransferable.

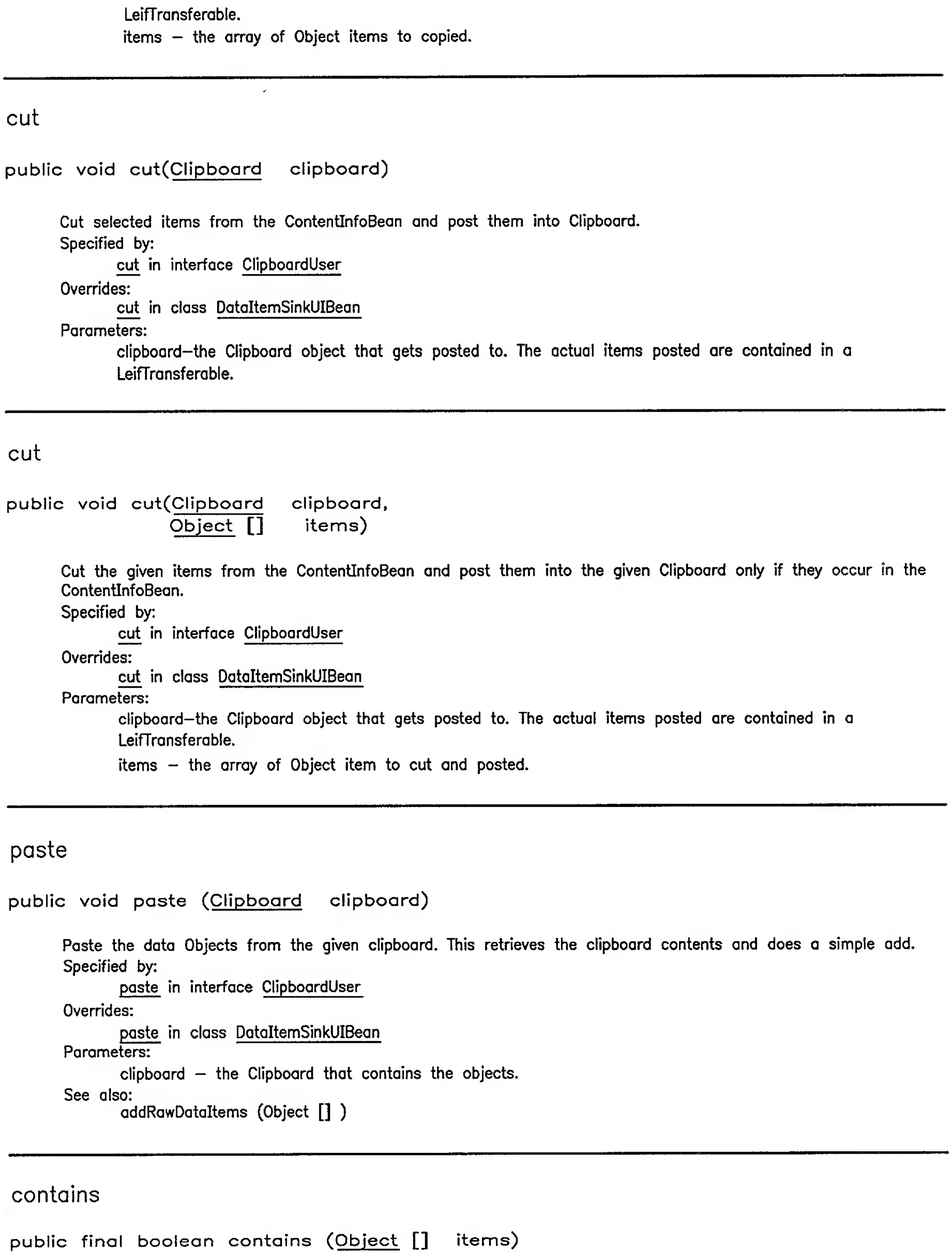
## copy

```
public void copy(Clipboard clipboard,
                 Object []  items)
```

Copies the given items into the Clipboard.
Specified by:
    copy in interface ClipboardUser
Overrides:
    copy in class DataItemSinkUIBean
Parameters:
    clipboard—the Clipboard object that gets posted to. The actual items posted are contained in a

FIG. 33M

FIG. 33N



LeifTransferable.
items – the array of Object items to copied.

### cut

```
public void cut(Clipboard  clipboard)
```

Cut selected items from the ContentInfoBean and post them into Clipboard.

Specified by:
cut in interface ClipboardUser

Overrides:
cut in class DataItemSinkUIBean

Parameters:
clipboard–the Clipboard object that gets posted to. The actual items posted are contained in a LeifTransferable.

### cut

```
public void cut(Clipboard  clipboard,
                Object []   items)
```

Cut the given items from the ContentInfoBean and post them into the given Clipboard only if they occur in the ContentInfoBean.

Specified by:
cut in interface ClipboardUser

Overrides:
cut in class DataItemSinkUIBean

Parameters:
clipboard–the Clipboard object that gets posted to. The actual items posted are contained in a LeifTransferable.
items – the array of Object item to cut and posted.

### paste

```
public void paste (Clipboard  clipboard)
```

Paste the data Objects from the given clipboard. This retrieves the clipboard contents and does a simple add.

Specified by:
paste in interface ClipboardUser

Overrides:
paste in class DataItemSinkUIBean

Parameters:
clipboard – the Clipboard that contains the objects.

See also:
addRawDataItems (Object [] )

### contains

```
public final boolean contains (Object []  items)
```

FIG. 330

Return true if this ContentInfoBean contains *all* the objects of the given array.
Parameters:
    items – an array of objects to locate in the ContentInfoBean.
Returns:
    true if there is only one object and it is contained, false otherwise

---

## containsComponent

```
public boolean containsComponent (Component component)
```

Check if the given component is contained by this InfoBean
Parameters:
    component – the Component to check for
Returns:
    true if it is contained, else false

---

## getLeifDataItemMenu

```
public JMenu getLeifDataItemMenu (LeifDataItem dataItem,
                                  boolean showCutPasteItems)
```

Return the data item menu for a LeifDataItem (usually the selected LeifDataItem). This is used by the menubar to add menuitems from this JMenu to a Data menu if there is exactly one DataItemSelected selected.
Overrides:
    getLeifDataItemMenu in class DataItemSinkUIBean
Parameters:
    dataItem – the LeifDataItem to get the menu for
    showCutPasteItems – true to allow cut and paste items to appear, false to omit them.
Returns:
    the JMenu for the given LeifDataItem

---

## isDragEnabled

```
public boolean isDragEnabled ()
```

Return true if the default Drag support enabled.
Overrides:
    isDragEnabled in class DataItemsSinkUIBean
Returns:
    true if drag is enabled, false if not, default is initialized to true.

---

## setDragEnabled

```
public void setDragEnabled (boolean enabledrag)
```

Set the status of the default Drag support.
Overrides:
    setDragEnabled in class DataItemSinkUIBean
Parameters:

FIG. 33P

enabledrag – true if default drag support should be used, false if not.

---

## setDragOwnerProxy

public void setDragOwnerProxy (DragOwner dragProxy)

Set a DragOwner "proxy" for this InfoBean.
Overrides:
setDragOwnerProxy in class DataItemSinkUIBean
Parameters:
dragProxy – a DragOwner implementation.

---

## isDropEnabled

public boolean isDropEnabled ()

Return true if the default Drop support is enabled.
Overrides:
isDropEnabled in class DataItemSinkUIBean
Returns:
true if drag is enabled, false if not, default is initialized to true.

---

## setDropEnabled

public void setDropEnabled (boolean enabledrop)

Set the status of the default Drop support.
Overrides:
setDropEnabled in class DataItemSinkUIBean
Parameters:
enabledrop – true if default drag support should be used, false if not.

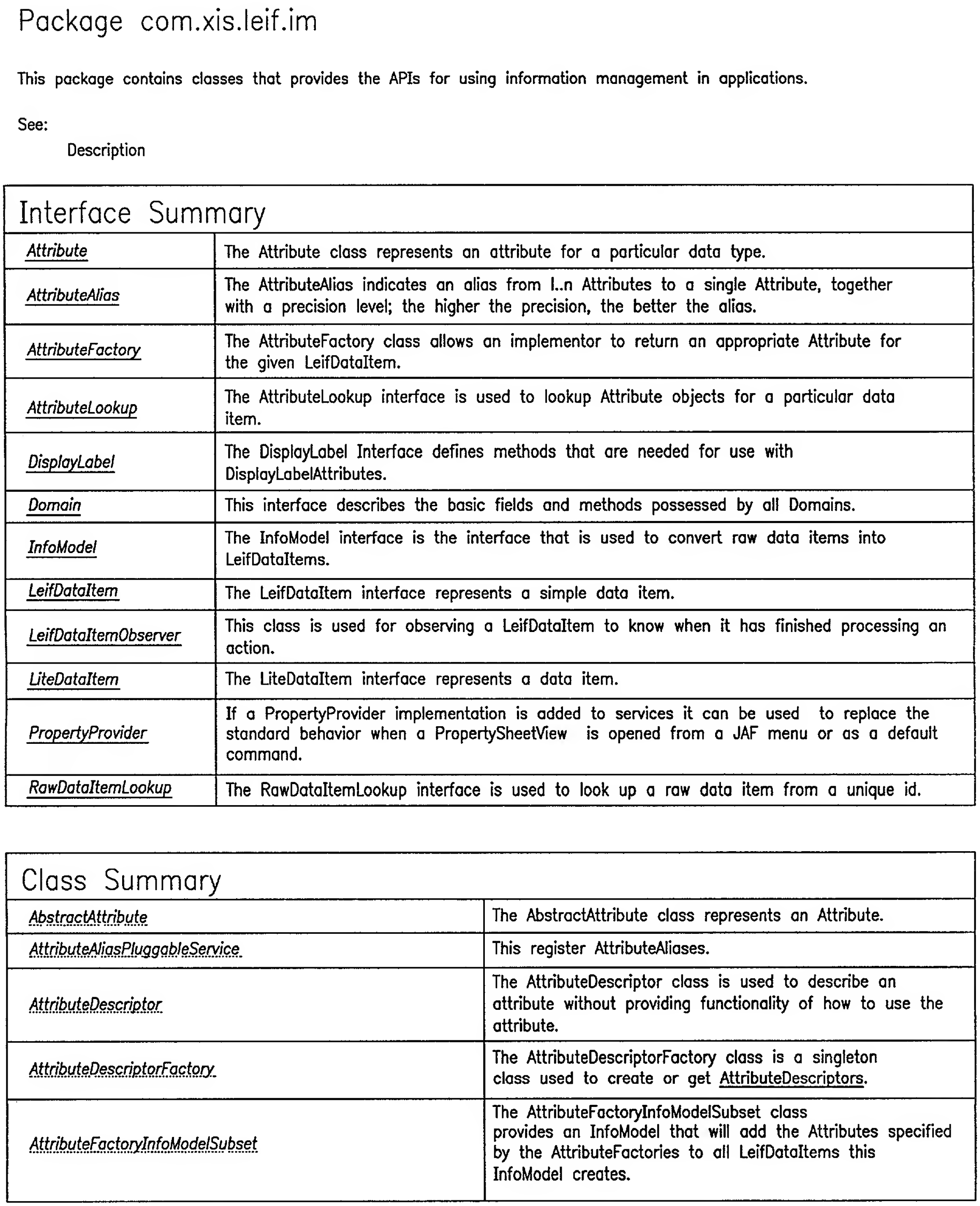
---

## setDropOwnerProxy

public void setDropOwnerProxy (DropOwner dropProxy)

Set a DropOwner "proxy" for this InfoBean.
Overrides:
setDropOwnerProxy in class DataItemSinkUIBean
Parameters:
dropProxy – a DropOwner implementation.

---



## Package com.xis.leif.im

This package contains classes that provides the APIs for using information management in applications.

See:
Description

| Interface Summary | |
|---|---|
| Attribute | The Attribute class represents an attribute for a particular data type. |
| AttributeAlias | The AttributeAlias indicates an alias from l..n Attributes to a single Attribute, together with a precision level; the higher the precision, the better the alias. |
| AttributeFactory | The AttributeFactory class allows an implementor to return an appropriate Attribute for the given LeifDataItem. |
| AttributeLookup | The AttributeLookup interface is used to lookup Attribute objects for a particular data item. |
| DisplayLabel | The DisplayLabel Interface defines methods that are needed for use with DisplayLabelAttributes. |
| Domain | This interface describes the basic fields and methods possessed by all Domains. |
| InfoModel | The InfoModel interface is the interface that is used to convert raw data items into LeifDataItems. |
| LeifDataItem | The LeifDataItem interface represents a simple data item. |
| LeifDataItemObserver | This class is used for observing a LeifDataItem to know when it has finished processing an action. |
| LiteDataItem | The LiteDataItem interface represents a data item. |
| PropertyProvider | If a PropertyProvider implementation is added to services it can be used to replace the standard behavior when a PropertySheetView is opened from a JAF menu or as a default command. |
| RawDataItemLookup | The RawDataItemLookup interface is used to look up a raw data item from a unique id. |

| Class Summary | |
|---|---|
| AbstractAttribute | The AbstractAttribute class represents an Attribute. |
| AttributeAliasPluggableService | This register AttributeAliases. |
| AttributeDescriptor | The AttributeDescriptor class is used to describe an attribute without providing functionality of how to use the attribute. |
| AttributeDescriptorFactory | The AttributeDescriptorFactory class is a singleton class used to create or get AttributeDescriptors. |
| AttributeFactoryInfoModelSubset | The AttributeFactoryInfoModelSubset class provides an InfoModel that will add the Attributes specified by the AttributeFactories to all LeifDataItems this InfoModel creates. |

FIG. 34A

FIG. 34B

| | |
|---|---|
| AttributeGetRequest | The AttributeGetRequest class is used to package all the necessary parameters for getting the value an attribute. |
| AttributeLockRequest | The AttributeLockRequest class bundles attributes needed to gain access to locked LeifDataItems. |
| Attributes | The Attributes is a container for holding attributes. |
| AttributeSetRequest | The AttributeSetRequest class is used to package all the necessary parameters for setting an attribute. |
| BaseDataItem | The BaseDataItem is the first wrapper around raw data items. |
| BaseInfoModel | //PENDING(RK): Any method marked with "PENDING" in the JavaDoc will//likely be removed before XIS is released in final form. |
| BaseInfoModelServicesProvider | The BaseInfoModelServicesProvider class will provide all the services available from the BaseInfoModel to the given BeanContextServices object. |
| Collection Properties | This class populates JAFMenus for generic collections. |
| DataItemActionManager | The DataItemActionManager class provides some useful static methods for dealing with actions on LeifDataItems. |
| DataItemActionManager.LeifReferenceActionListener | This class is an actionListener to be used with LeifReference "Load" menus. |
| DataItemMenuSet | The DataItemMenuSet class is used by the LeifJAFUtilities class to return essentially a DataItem popup menu with annotation. |
| DataItemMenuSetEntry | The DataItemMenuSet.Entry class encapsulates a DataItem and it's menu, and also provides some convenience methods for adding additional menu items. |
| DefaultWrapperAttribute | The DefaultWrapperAttribute class is a generic attribute that is the superclass of all defaults in generated domain attributes. |
| DisplayLabelAttribute | The DisplayLabelAttribute class is used to display one or more Attribute values in conjunction with string literals specified by users. |
| DisplayLabelData | The DisplayLabelData class is used by the DisplayLabelAttribute to store a mapping of LeifDataItems to DisplayLabelTemplates. |
| DisplayLabelTemplate | The DisplayLabelTemplate class is used by the DisplayLabelAttribute to compute and store editing and rendering values for every LeifDataItem that has the attribute. |
| DomainMethod | Abstractly represents a Domain Method. |
| DomainMethodDescriptor | The DomainMethodDescriptor class is used to describe a DomainMethod. |
| DomainMethodDescriptorFactory | The DomainMethodDescriptorFactory class is a singleton class used to create or get DomainMethodDescriptors. |
| DomainWrapper | This class adds methods to LeifDataItem delegator that are useful in the domain wrappers. |
| DynamicAttributes | The DynamicAttributes class is used for storing dynamic attributes. |

FIG. 34C

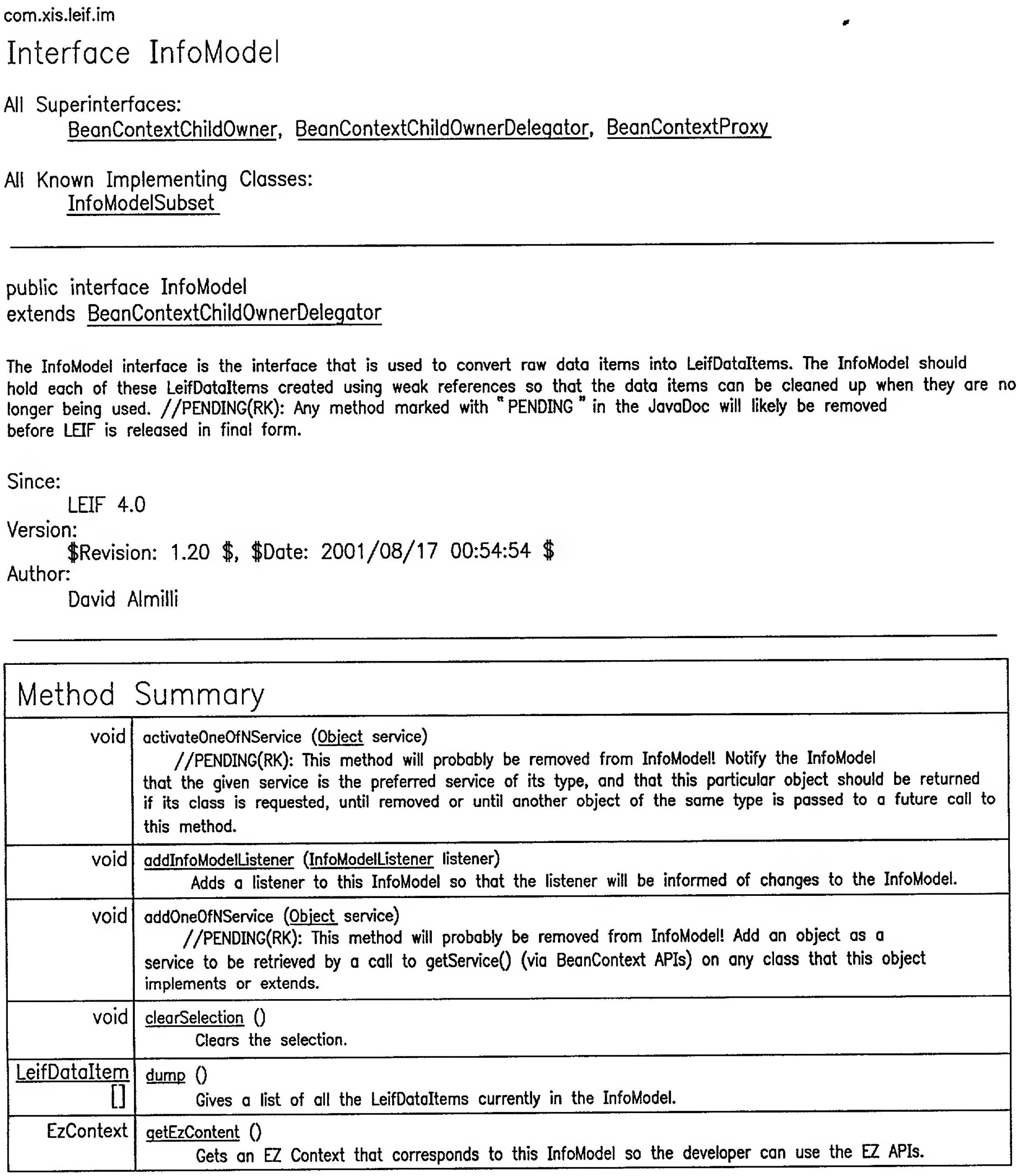
| | |
|---|---|
| FieldMetaData | FieldMetaData specifies sorting and subset criteria for an attribute. |
| FieldMetaDatas | The FieldMetaDatas class represents a collection of FieldMetaData for a data item. |
| InfoModelDataItem | The InfoModelDataItem allows views to wrap LeifDataItems and add/remove/modify attributes that will only affect that view. |
| InfoModelSubset | Typically when creating an InfoModel to nest within an existing InfoModel, which is done by ViewUIBeans, an InfoModelSubset is used. |
| InvalidWrapperAttribute | The InvalidWrapperAttribute class |
| LeifDataItemComparator | The LeifDataItemComparator compares LeifDataItems by AttributeDescriptor supplied by the user. |
| LeifDataItemDelegator | Implements the methods in LeifDataItem in a wrapper so you don't have to. |
| LeifDataItemSorter | The LeifDataItemSorter provides a default sorting tool for all LEIF LeifDataItem objects. |
| LeifDataItemUpdate | This classes is used with the LeifDataItemObserver. |
| LeifInitialization | The LeifInitialization class handles some standard initialization for most XIS Applications. |
| LeifJAFUtilities | The LeifJAFUtilities class provides some useful static methods for Leif-related JavaBeans Activation Framework (JAF) processing. |
| LeifJAFUtilities.LeifReferenceActionListener | This class is an actionListener to be used with LeifReference " Load " menus. |
| LeifRequest | The LeifRequest class is used to package all the necessary parameters for requesting information for a LeifDataItem. |
| LeifTransaction | The LeifTransaction class is used to construct a transaction. |
| LockedLeifDataItem | The LockedLeifDataItem class is used to enable locking on the data item. |
| MethodRequest | The MethodRequest class is used to package all the necessary parameters for invoking a DomainMethod for a LeifDataItem. |
| MutableAttributeDescriptor | Mutable subclass of AttributeDescriptor. |
| ObserverSupport | This class provides useful support for using the LeifDataItemObserver. |
| RequestPool | The RequestPool class is used to to assist Object pooling. |
| Resources | The Resources class is automatically generated and must be public, but it is intended to be used only by Java's internationalization support classes. |
| SelectableDataItem | Creates a wrapper around a LeifDataItem for a SelectableInfoModel. |
| SelectableInfoModel | Manages selections for the selectable leif data items that are contained within this model. |
| Translator | A major design goal for XIS was to provide the ability to integrate existing data item classes without modifying them. |

FIG. 34D

| | |
|---|---|
| TranslatorRegistry | Provides a central location for maintaining Translators, extended Translators and locating Domain methods on data items. |
| UndefinedAttribute | The UndefinedAttribute class represents an undefined attributes. |
| VisibilityAttribute | The VisibilityAttribute class is an Attribute that is ready to use for LeifDataItem visibility. |

| Exception Summary | |
|---|---|
| DataItemNotFoundException | The DataItemNotFoundException class is an exception that can be thrown when trying to look up a data item from an id |
| InvalidObjectSchemaException | Signals that there was a problem with the creation or modification of an ObjectSchema. |
| TranslatorException | The TranslatorException class |
| UnconvertibleAliasException | Indicates that the requested attribute alias could not be calculated or converted. |
| UndefinedLeifAttributeException | Indicates that the requested attribute is not applicable for the object. |
| UndefinedLeifMethodException | The UndefinedLeifMethodException class indicates that the data item does not define the method. |
| UnremovableAttributeException | The UnremovableAttributeException class indicates an attempt to remove an Attribute that was defined by the raw data item (either by reflection or a Translator.) Only additional Attributes added to LeifDataItems can be removed. |

# FIG. 35A



com.xis.leif.im

## Interface InfoModel

All Superinterfaces:
BeanContextChildOwner, BeanContextChildOwnerDelegator, BeanContextProxy

All Known Implementing Classes:
InfoModelSubset

public interface InfoModel
extends BeanContextChildOwnerDelegator

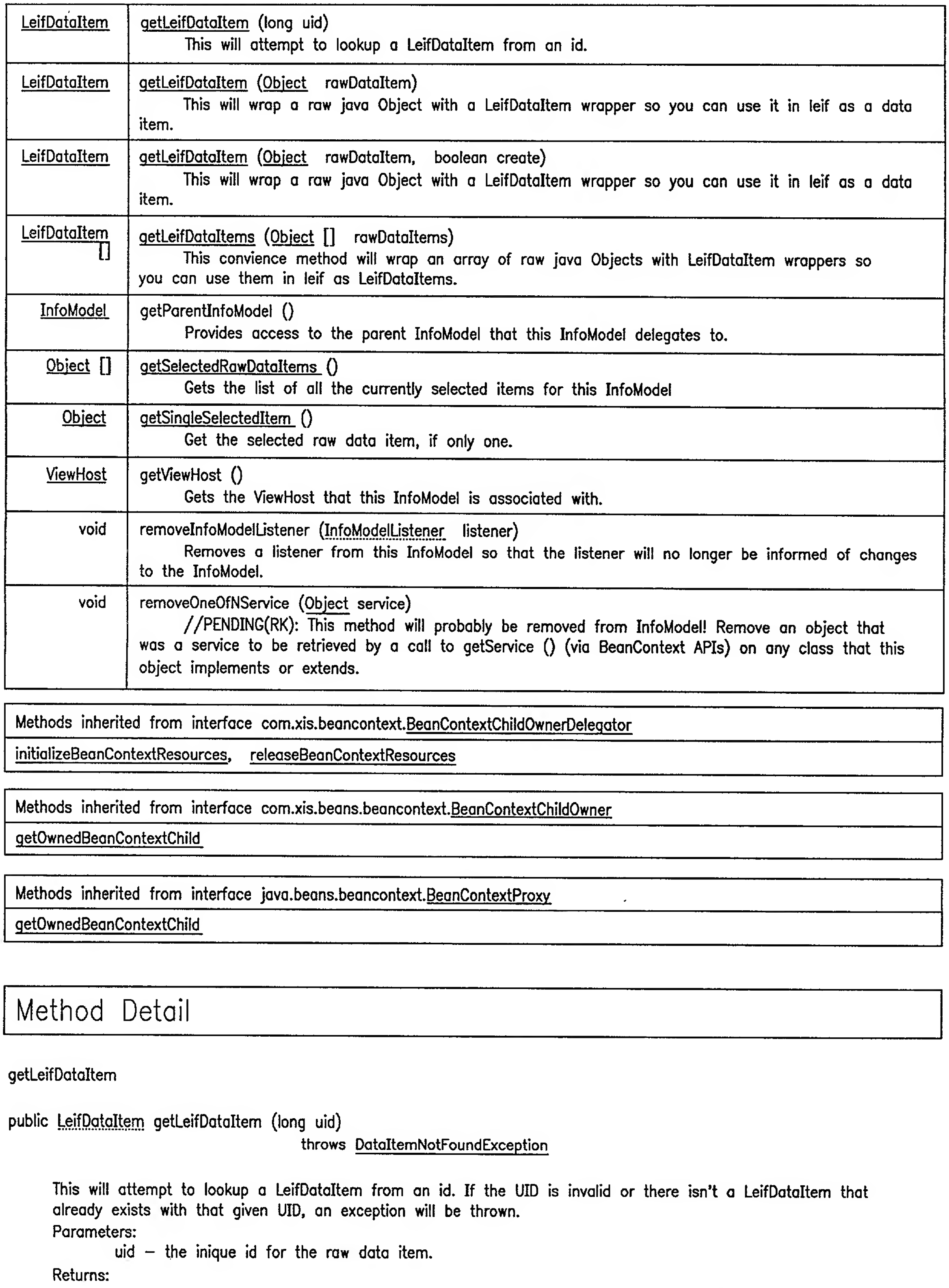
The InfoModel interface is the interface that is used to convert raw data items into LeifDataItems. The InfoModel should hold each of these LeifDataItems created using weak references so that the data items can be cleaned up when they are no longer being used. //PENDING(RK): Any method marked with "PENDING" in the JavaDoc will likely be removed before LEIF is released in final form.

Since:
LEIF 4.0
Version:
$Revision: 1.20 $, $Date: 2001/08/17 00:54:54 $
Author:
David Almilli

## Method Summary

| | |
|---|---|
| void | activateOneOfNService (Object service)<br>//PENDING(RK): This method will probably be removed from InfoModel! Notify the InfoModel that the given service is the preferred service of its type, and that this particular object should be returned if its class is requested, until removed or until another object of the same type is passed to a future call to this method. |
| void | addInfoModelListener (InfoModelListener listener)<br>Adds a listener to this InfoModel so that the listener will be informed of changes to the InfoModel. |
| void | addOneOfNService (Object service)<br>//PENDING(RK): This method will probably be removed from InfoModel! Add an object as a service to be retrieved by a call to getService() (via BeanContext APIs) on any class that this object implements or extends. |
| void | clearSelection ()<br>Clears the selection. |
| LeifDataItem [] | dump ()<br>Gives a list of all the LeifDataItems currently in the InfoModel. |
| EzContext | getEzContent ()<br>Gets an EZ Context that corresponds to this InfoModel so the developer can use the EZ APIs. |

FIG. 35B



| | |
|---|---|
| LeifDataItem | getLeifDataItem (long uid)<br>This will attempt to lookup a LeifDataItem from an id. |
| LeifDataItem | getLeifDataItem (Object rawDataItem)<br>This will wrap a raw java Object with a LeifDataItem wrapper so you can use it in leif as a data item. |
| LeifDataItem | getLeifDataItem (Object rawDataItem, boolean create)<br>This will wrap a raw java Object with a LeifDataItem wrapper so you can use it in leif as a data item. |
| LeifDataItem [] | getLeifDataItems (Object [] rawDataItems)<br>This convience method will wrap an array of raw java Objects with LeifDataItem wrappers so you can use them in leif as LeifDataItems. |
| InfoModel | getParentInfoModel ()<br>Provides access to the parent InfoModel that this InfoModel delegates to. |
| Object [] | getSelectedRawDataItems ()<br>Gets the list of all the currently selected items for this InfoModel |
| Object | getSingleSelectedItem ()<br>Get the selected raw data item, if only one. |
| ViewHost | getViewHost ()<br>Gets the ViewHost that this InfoModel is associated with. |
| void | removeInfoModelListener (InfoModelListener listener)<br>Removes a listener from this InfoModel so that the listener will no longer be informed of changes to the InfoModel. |
| void | removeOneOfNService (Object service)<br>//PENDING(RK): This method will probably be removed from InfoModel! Remove an object that was a service to be retrieved by a call to getService () (via BeanContext APIs) on any class that this object implements or extends. |

| Methods inherited from interface com.xis.beancontext.BeanContextChildOwnerDelegator |
|---|
| initializeBeanContextResources, releaseBeanContextResources |

| Methods inherited from interface com.xis.beans.beancontext.BeanContextChildOwner |
|---|
| getOwnedBeanContextChild |

| Methods inherited from interface java.beans.beancontext.BeanContextProxy |
|---|
| getOwnedBeanContextChild |

## Method Detail

### getLeifDataItem

```
public LeifDataItem getLeifDataItem (long uid)
                        throws DataItemNotFoundException
```

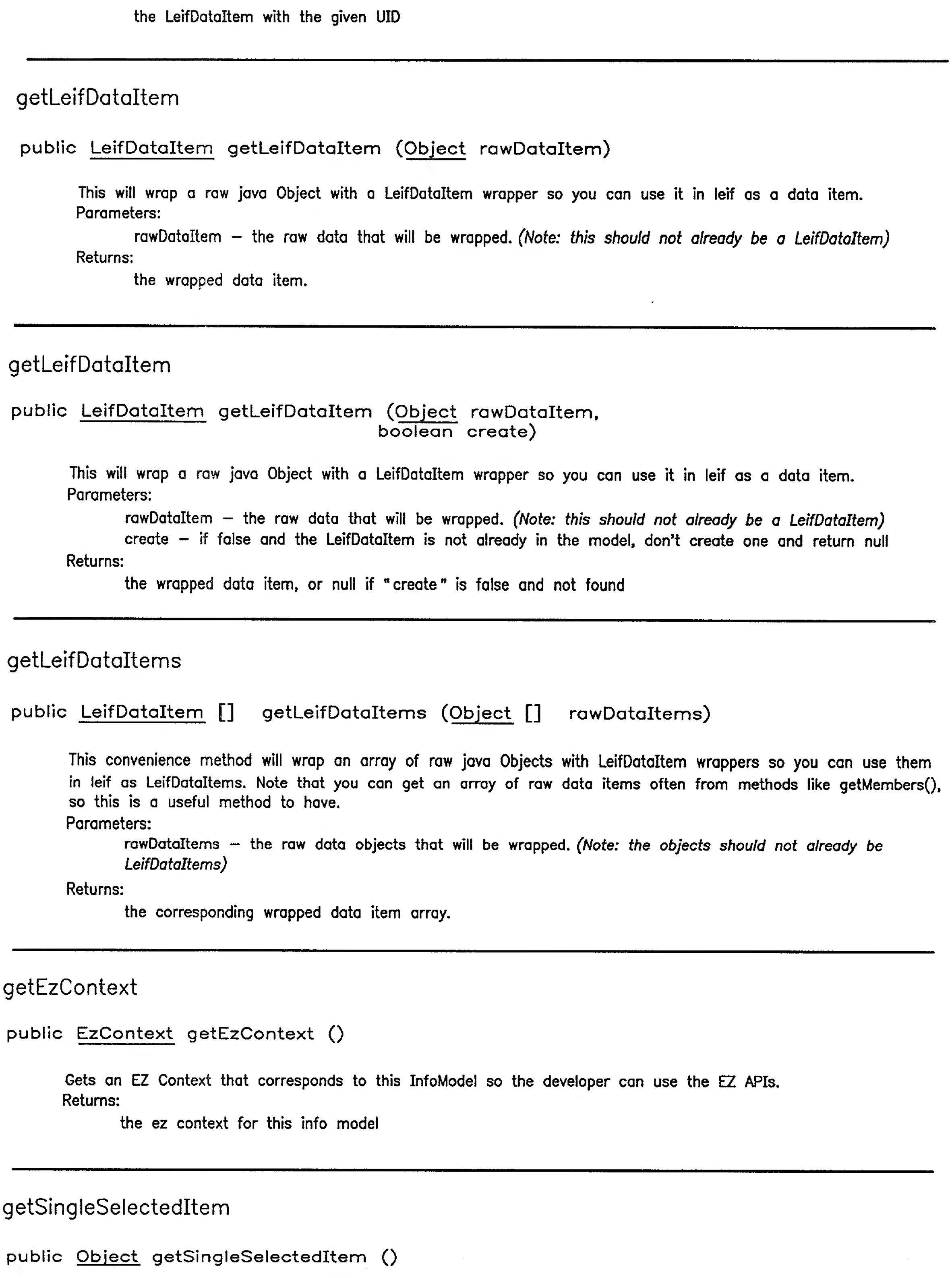
This will attempt to lookup a LeifDataItem from an id. If the UID is invalid or there isn't a LeifDataItem that already exists with that given UID, an exception will be thrown.

Parameters:

uid – the inique id for the raw data item.

Returns:

FIG. 35C



the LeifDataItem with the given UID

### getLeifDataItem

```
public LeifDataItem getLeifDataItem (Object rawDataItem)
```

This will wrap a raw java Object with a LeifDataItem wrapper so you can use it in leif as a data item.
Parameters:
rawDataItem – the raw data that will be wrapped. *(Note: this should not already be a LeifDataItem)*
Returns:
the wrapped data item.

### getLeifDataItem

```
public LeifDataItem getLeifDataItem (Object rawDataItem,
                                     boolean create)
```

This will wrap a raw java Object with a LeifDataItem wrapper so you can use it in leif as a data item.
Parameters:
rawDataItem – the raw data that will be wrapped. *(Note: this should not already be a LeifDataItem)*
create – if false and the LeifDataItem is not already in the model, don't create one and return null
Returns:
the wrapped data item, or null if "create" is false and not found

### getLeifDataItems

```
public LeifDataItem [] getLeifDataItems (Object [] rawDataItems)
```

This convenience method will wrap an array of raw java Objects with LeifDataItem wrappers so you can use them in leif as LeifDataItems. Note that you can get an array of raw data items often from methods like getMembers(), so this is a useful method to have.
Parameters:
rawDataItems – the raw data objects that will be wrapped. *(Note: the objects should not already be LeifDataItems)*
Returns:
the corresponding wrapped data item array.

### getEzContext

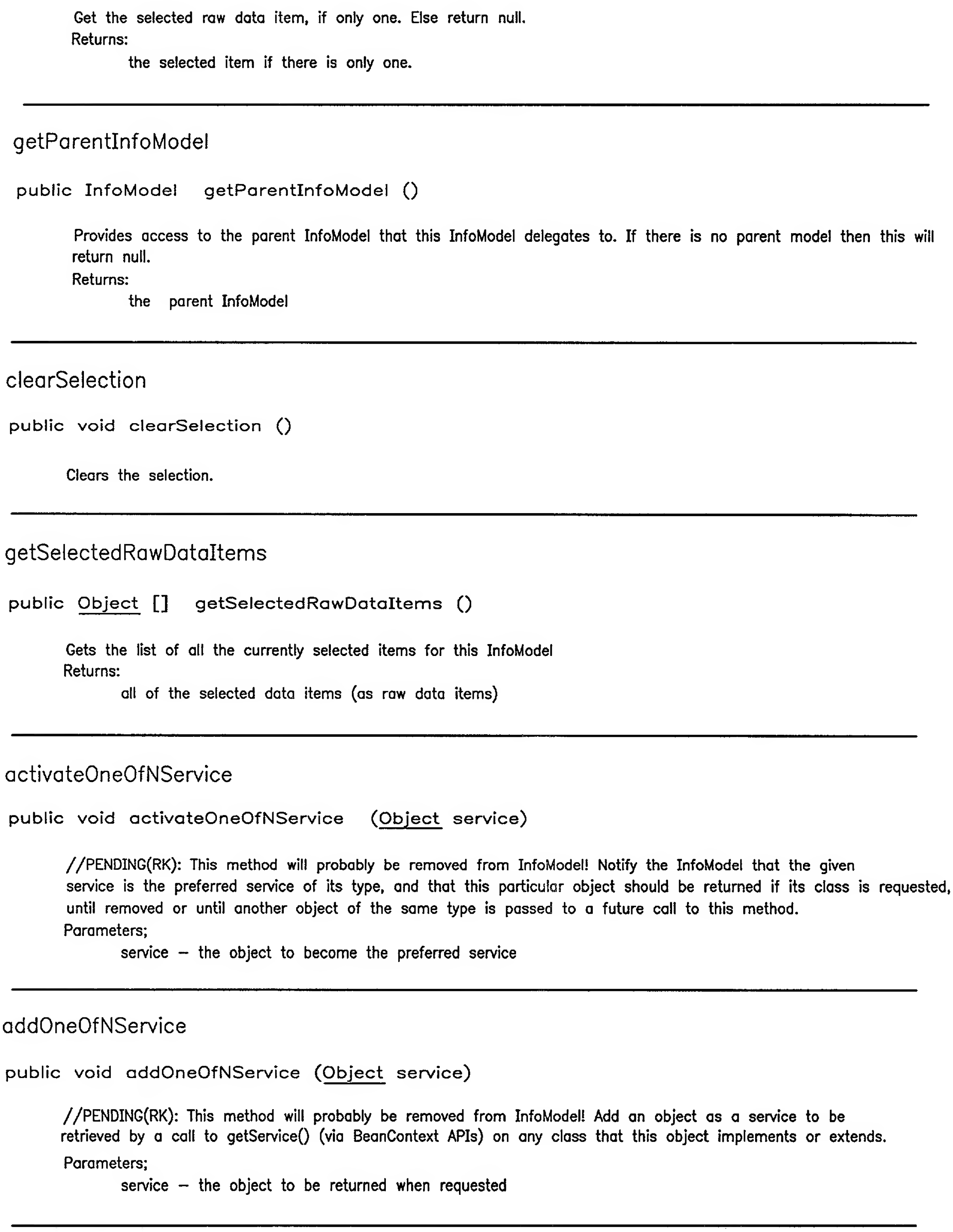
```
public EzContext getEzContext ()
```

Gets an EZ Context that corresponds to this InfoModel so the developer can use the EZ APIs.
Returns:
the ez context for this info model

### getSingleSelectedItem

```
public Object getSingleSelectedItem ()
```

FIG. 35D



Get the selected raw data item, if only one. Else return null.
Returns:
the selected item if there is only one.

## getParentInfoModel

```
public InfoModel   getParentInfoModel ()
```

Provides access to the parent InfoModel that this InfoModel delegates to. If there is no parent model then this will return null.
Returns:
the parent InfoModel

## clearSelection

```
public void clearSelection ()
```

Clears the selection.

## getSelectedRawDataItems

```
public Object [] getSelectedRawDataItems ()
```

Gets the list of all the currently selected items for this InfoModel
Returns:
all of the selected data items (as raw data items)

## activateOneOfNService

```
public void activateOneOfNService  (Object service)
```

//PENDING(RK): This method will probably be removed from InfoModel! Notify the InfoModel that the given service is the preferred service of its type, and that this particular object should be returned if its class is requested, until removed or until another object of the same type is passed to a future call to this method.
Parameters;
service – the object to become the preferred service

## addOneOfNService

```
public void addOneOfNService (Object service)
```

//PENDING(RK): This method will probably be removed from InfoModel! Add an object as a service to be retrieved by a call to getService() (via BeanContext APIs) on any class that this object implements or extends.
Parameters;
service – the object to be returned when requested

FIG. 35E

### removeOneOfNService

public void removeOneOfNService (Object service)

//PENDING(RK): This method will probably be removed from InfoModel! Removed an object that was a service to be retrieved by a call to getService() (via BeanContext APIs) on any class that this object implements or extends.
Parameters:
service – the object to be removed from service

---

### getViewHost

public ViewHost getViewHost ()

Gets the ViewHost that this InfoModel is associated with. If this InfoModel is not associated with a ViewHost then this will return null.
Returns:
the view host that is maintaining this InfoModel.

---

### addInfoModelListener

public void addInfoModelListener (InfoModelListener listener)

Adds a listener to this InfoModel so that the listener will be informed of changes to the InfoModel.
Parameters:
listener – the listener to add

---

### removeInfoModelListener

public void removeInfoModelListener (InfoModelListener listener)

Removes a listener from this InfoModel so that the listener will no longer be informed of changes to the InfoModel.
Parameters:
listener – the listener to remove

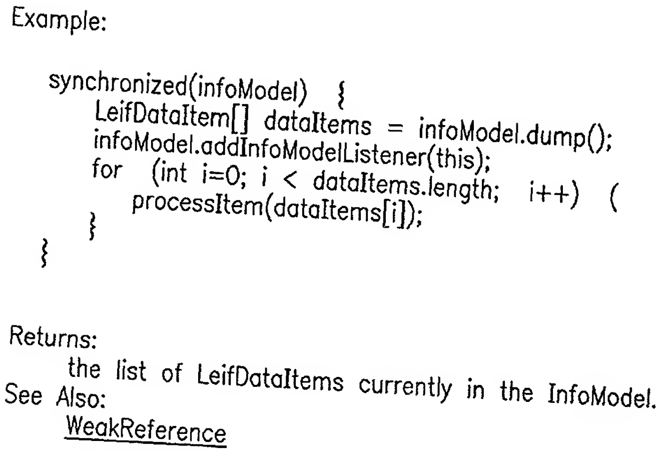
---

### dump

public LeifDataItem [] dump()

Gives a list of all the LeifDataItems currently in the InfoModel. It is highly recommended to use this method only if you absolutely have no other way of accomplishing the task you need to do. Please keep in mind that if you hold onto the LeifDataItems contained in the array returned or if you hold onto the array itself, the items will not be removed from InfoModel until you release them. If you wish to hold onto them, you should wrap them in WeakReference objects.

*Note: When you use the dump() method in combination with the addInfoModelListener so that you can keep track of the same set of LeifDataItems as the InfoModel, you can synchronize on the InfoModel to get the dump and then add a listener to receive events of future changes.*



Example:

```
synchronized(infoModel)  {
    LeifDataItem[] dataItems = infoModel.dump();
    infoModel.addInfoModelListener(this);
    for   (int i=0; i < dataItems.length;  i++)   (
        processItem(dataItems[i]);
    }
}
```

Returns:

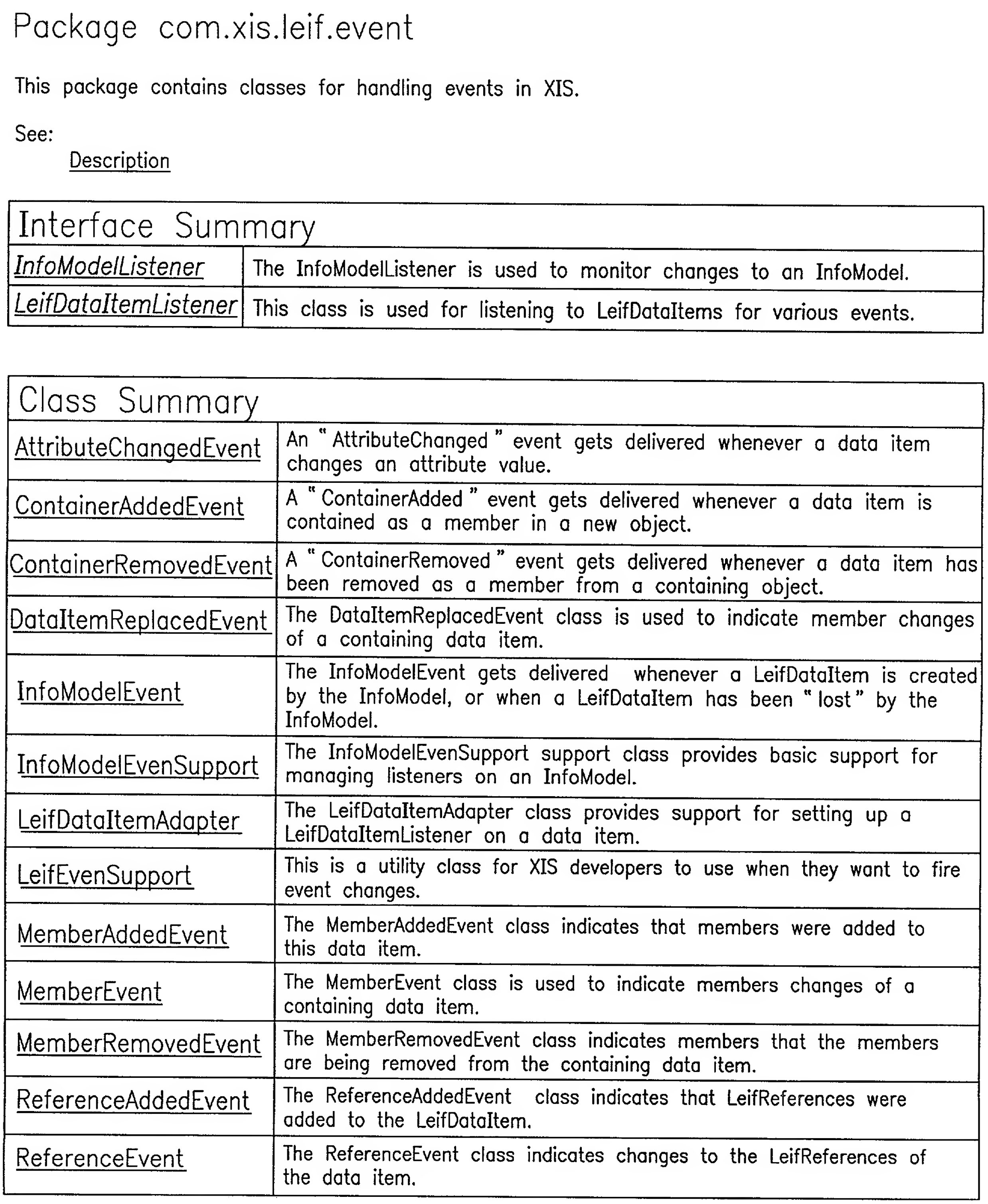
the list of LeifDataItems currently in the InfoModel.

See Also:

WeakReference

FIG. 35F

FIG. 36A



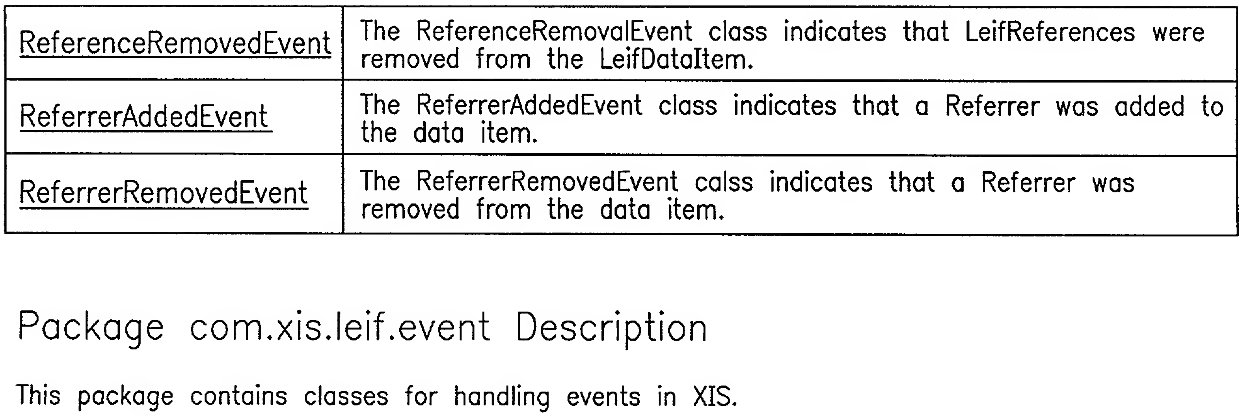
# Package com.xis.leif.event

This package contains classes for handling events in XIS.

See:
Description

| Interface Summary | |
|---|---|
| *InfoModelListener* | The InfoModelListener is used to monitor changes to an InfoModel. |
| *LeifDataItemListener* | This class is used for listening to LeifDataItems for various events. |

| Class Summary | |
|---|---|
| AttributeChangedEvent | An " AttributeChanged " event gets delivered whenever a data item changes an attribute value. |
| ContainerAddedEvent | A " ContainerAdded " event gets delivered whenever a data item is contained as a member in a new object. |
| ContainerRemovedEvent | A " ContainerRemoved " event gets delivered whenever a data item has been removed as a member from a containing object. |
| DataItemReplacedEvent | The DataItemReplacedEvent class is used to indicate member changes of a containing data item. |
| InfoModelEvent | The InfoModelEvent gets delivered whenever a LeifDataItem is created by the InfoModel, or when a LeifDataItem has been " lost " by the InfoModel. |
| InfoModelEvenSupport | The InfoModelEvenSupport support class provides basic support for managing listeners on an InfoModel. |
| LeifDataItemAdapter | The LeifDataItemAdapter class provides support for setting up a LeifDataItemListener on a data item. |
| LeifEvenSupport | This is a utility class for XIS developers to use when they want to fire event changes. |
| MemberAddedEvent | The MemberAddedEvent class indicates that members were added to this data item. |
| MemberEvent | The MemberEvent class is used to indicate members changes of a containing data item. |
| MemberRemovedEvent | The MemberRemovedEvent class indicates members that the members are being removed from the containing data item. |
| ReferenceAddedEvent | The ReferenceAddedEvent class indicates that LeifReferences were added to the LeifDataItem. |
| ReferenceEvent | The ReferenceEvent class indicates changes to the LeifReferences of the data item. |



| | |
|---|---|
| ReferenceRemovedEvent | The ReferenceRemovalEvent class indicates that LeifReferences were removed from the LeifDataItem. |
| ReferrerAddedEvent | The ReferrerAddedEvent class indicates that a Referrer was added to the data item. |
| ReferrerRemovedEvent | The ReferrerRemovedEvent calss indicates that a Referrer was removed from the data item. |

## Package com.xis.leif.event Description

This package contains classes for handling events in XIS.

FIG. 36B

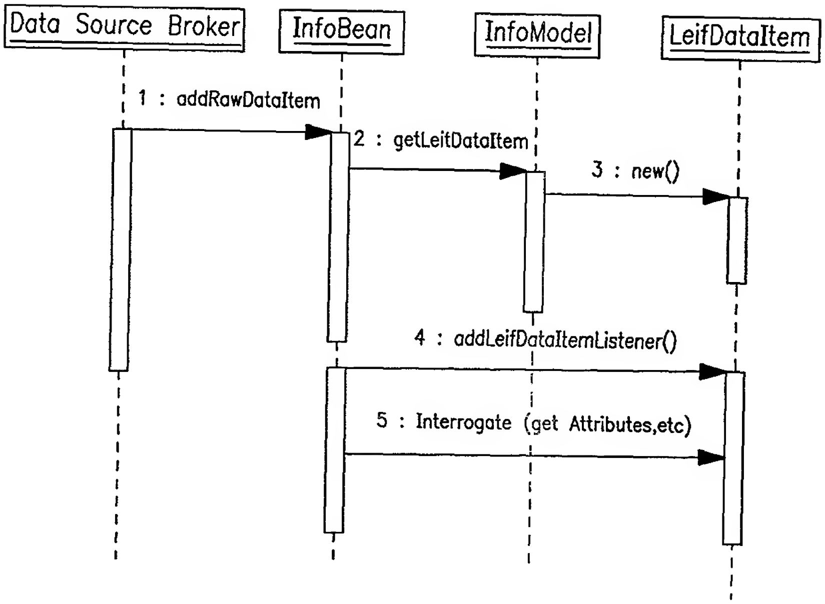
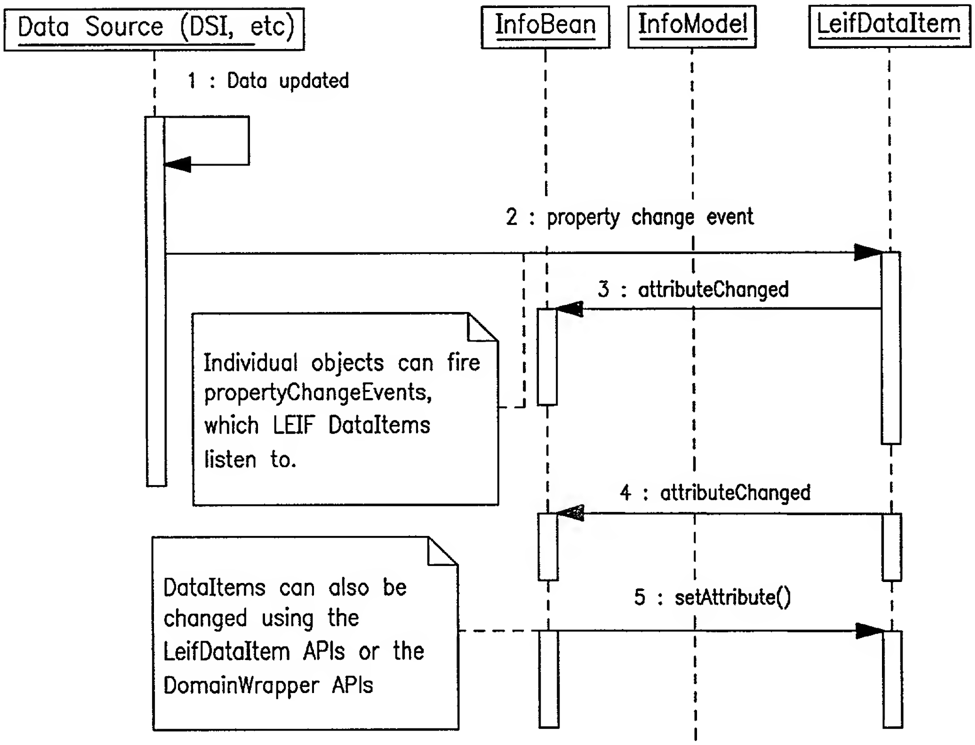

Data Source Broker
InfoBean
InfoModel
LeifDataItem
1 : addRawDataItem
2 : getLeitDataItem
3 : new()
4 : addLeifDataItemListener()
5 : Interrogate (get Attributes,etc)

FIG. 36C



Individual objects can fire propertyChangeEvents, which LEIF DataItems listen to.

DataItems can also be changed using the LeifDataItem APIs or the DomainWrapper APIs

FIG. 36D

## TestHarness.java

```
/* XIS Tutorial standalone sequence example 5 XIS interfacing. */

import javax.swing.JFrame;
import java.awt.event.WindowAdapter;
import java.awt.event.WindowEvent;
/*{*/
import java.awt.GridLayout;
import java.awt.Toolkit;
import java.awt.Dimension;
import java.awt.event.ComponentAdapter;
import java.awt.event.ComponentEvent;
import javax.swing.JSplitPane;
import javax.swing.JComponent;
/*}*/
import jclass.chart.JCChart;
import com.xis.leif.im.BaseInfoModel;
import com.xis.plot.PlotInfoBean;
import com.xis.plot.chartviews.LeifChartView;
/*{*/
import com.xis.table.TableInfoBean;
import com.xis.tree.TreeInfoBean;
/*}*/

public class TestHarness {

   public static void main(String[] args) {

       // the plugin manager is only required for more complex applications
       // involving multiple components integrated at runtime
       BaseInfoModel.setStartingPlugInManager(false);

/*{*/
       HelloWorld hello1 = new HelloWorld("First HelloWorld object.");
       HelloWorld hello2 = new HelloWorld("Second HelloWorld object.");
       HelloWorld hello3 = new HelloWorld("Third HelloWorld object.");
       HelloWorld hello4 = new HelloWorld("Fourth HelloWorld object.");
       HelloWorld hello5 = new HelloWorld("Fifth HelloWorld object.");
```

FIG. 37A

## Continuation of TestHarness.java

```
        Object[] helloArray = new Object[] { hello1, hello2, hello3, hello4,
                              hello5 };

        // create table and plot infobeans to display HelloWorld objects
        TableInfoBean table = new TableInfoBean();
/*}*/
        PlotInfoBean plot = new PlotInfoBean();
        plot.setChartType(JCChart.BAR);
        // the alternatives are SCATTER_PLOT, PLOT, AREA, PIE, CANDLE,
        // and STACKING_BAR, though not all will make sense in this example

        // We can set the attribute for initial display on the plot;
        // see step 3 for further comments.
        plot.setYAxisAttribute(
           "com.xis.domains.movement.MovementDomain.speed");
        plot.setDynamicAdjustment(true);  // so axes track value magnitude
        plot.setBarChartAdjusting(true);  // needed in some cases for bar chart

/*{*/
        // a top-level frame as before to hold both plot and table side-by-side
        JFrame tablePlotFrame = new JFrame("HelloWorld(s) Table/Plot");
        // use a repaired JSplitPane (see below) to manage the two beans
        SaneJSplitPane splitpane = new SaneJSplitPane(table,plot,
           new Dimension(table.getPreferredSize().width +
                      plot.getPreferredSize().width,
                      Math.min(table.getPreferredSize().height,
                            plot.getPreferredSize().width)),
           0.50);
        tablePlotFrame.getContentPane().add(splitpane);
        tablePlotFrame.pack();
        tablePlotFrame.setVisible(true);

        // a tree infobean to display our HelloWorld objects
        TreeInfoBean tree = new TreeInfoBean("HelloWorld(s) Tree");
        tree.addRawDataItems(helloArray);

        // a top-level frame to hold our tree infobean
        JFrame treeFrame = new JFrame("HelloWorld(s) Tree");
```

FIG. 37B

## Continuation of TestHarness.java

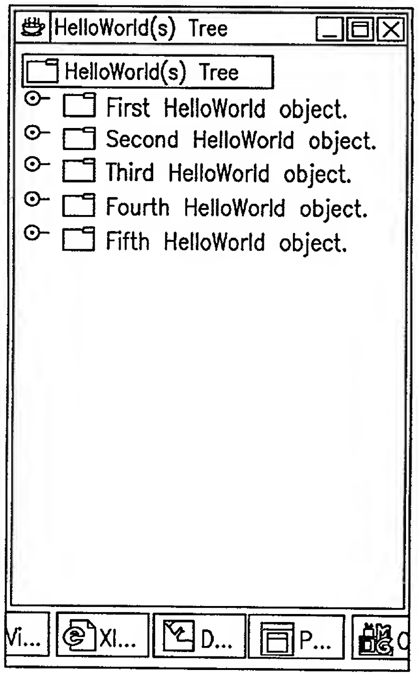
```
    // avoid placing the windows on top of one another if we can
    int cutoffHeight = 424;
    if (Toolkit.getDefaultToolkit().getScreenSize().getHeight() >
      cutoffHeight + 200) {
      treeFrame.setLocation(348,cutoffHeight+7);
    }
/*}*/
    // add a listener for window closing
    treeFrame.addWindowListener(
      new WindowAdapter() {
        public void windowClosing(WindowEvent e) {
          System.exit(0);
        }
      }
    );

    // stick the tree infobean in the frame and display it
    treeFrame.getContentPane().add(tree);
    treeFrame.pack();
    treeFrame.setVisible(true);

  } // main


/*{*/
  /**
   * This class overrides the default JSplitPane to provide a reasonable
   * resize behavior: maintain the left and right panels in the same
   * proportions.
   */
  public static final class SaneJSplitPane extends JSplitPane {

    private int    lastWidth;
    private double lastDividerProp;

    public SaneJSplitPane(JComponent leftComponent,
                          JComponent rightComponent,
                          Dimension dims, double startProportion) {
```

FIG. 37C

## Continuation of TestHarness.java

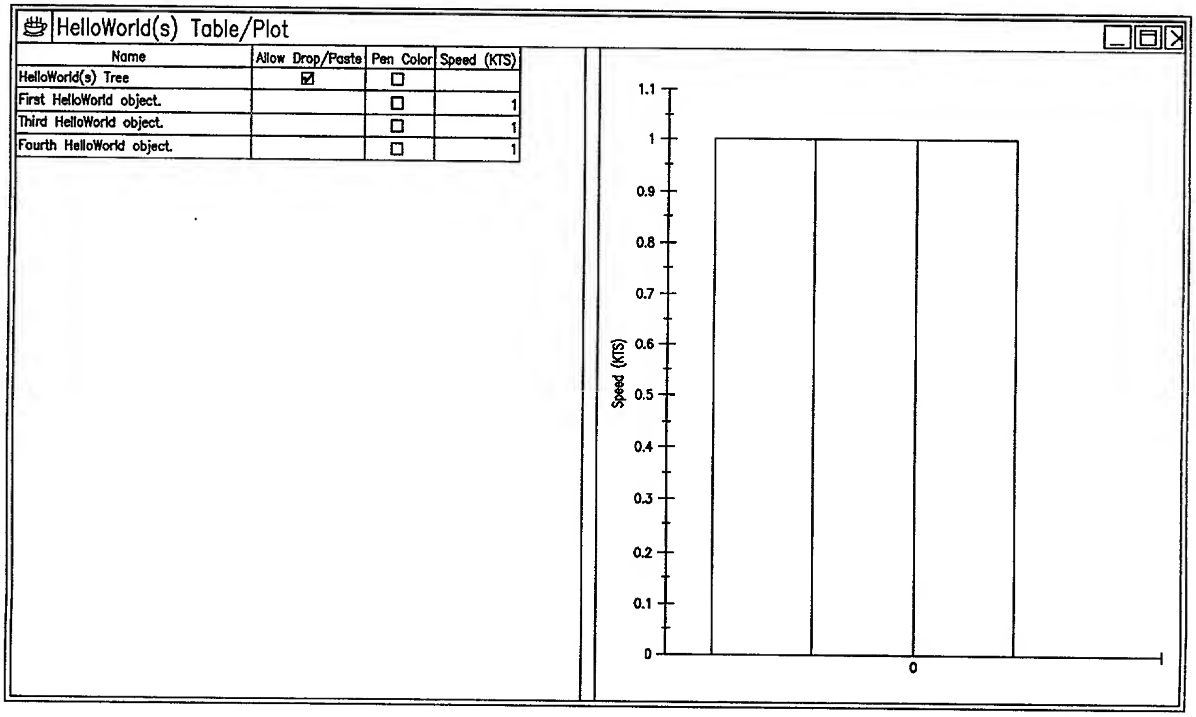
```
          super(JSplitPane.HORIZONTAL_SPLIT,
             leftComponent, rightComponent);
          setSize(dims);

          // Since the JSplitPane doesn't set the lastDividerLocation
          // variable, nor does it provide any other easier way to maintain
          // the split proportion on resize, we must track the divider
          // location ourself.
          lastWidth = dims.width;
          lastDividerProp = startProportion;
          setDividerLocation(startProportion);

          // this listens for resize events on the splitpane and makes sure
          // we keep same split proportions
          addComponentListener(new ComponentAdapter() {
                public void componentResized(ComponentEvent event) {
                   setDividerLocation(lastDividerProp);
                   lastWidth = (int)event.getComponent().
                      getSize().getWidth();
                }});
          // only way to know if divider moved by user is to listen for
          // resize events on the components; this isn't foolproof (since
          // resizes can come from other sources) but it works well enough
          leftComponent.addComponentListener(new ComponentAdapter() {
                public void componentResized(ComponentEvent event) {
                   // we add in getDividerSize() / 4 to compensate for a
                   // bug in JSplitPane which doesn't take account of the
                   // divider width in location-proportion conversions
                   lastDividerProp = (double)(getDividerLocation() +
                      (getDividerSize() / 4)) / lastWidth;
                }});

       }

     }
   /*}*/

   }
```

FIG. 37D



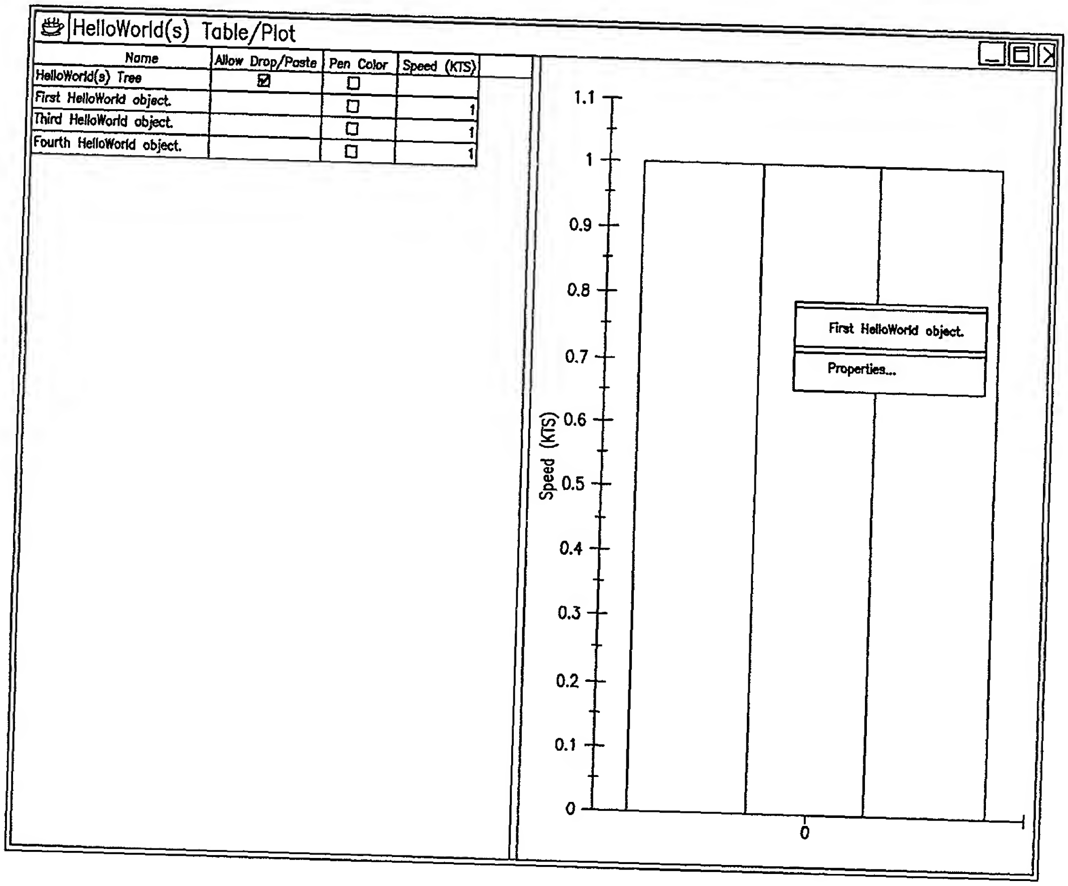
HelloWorld(s) Tree
- First HelloWorld object.
- Second HelloWorld object.
- Third HelloWorld object.
- Fourth HelloWorld object.
- Fifth HelloWorld object.

FIG. 38A



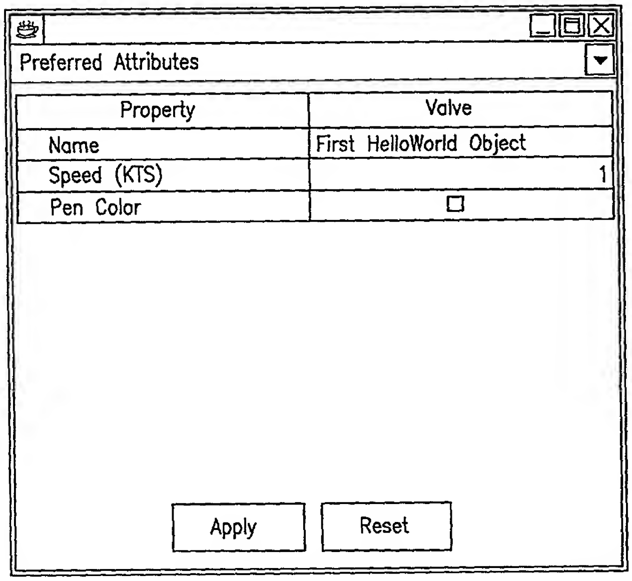
| Name | Allow Drop/Paste | Pen Color | Speed (KTS) |
|---|---|---|---|
| HelloWorld(s) Tree | ☑ | □ | |
| First HelloWorld object. | | □ | 1 |
| Third HelloWorld object. | | □ | 1 |
| Fourth HelloWorld object. | | □ | 1 |

FIG. 38B



| Name | Allow Drop/Paste | Pen Color | Speed (KTS) |
|---|---|---|---|
| HelloWorld(s) Tree | ☑ | □ | |
| First HelloWorld object. | | □ | 1 |
| Third HelloWorld object. | | □ | 1 |
| Fourth HelloWorld object. | | □ | 1 |

FIG. 38C

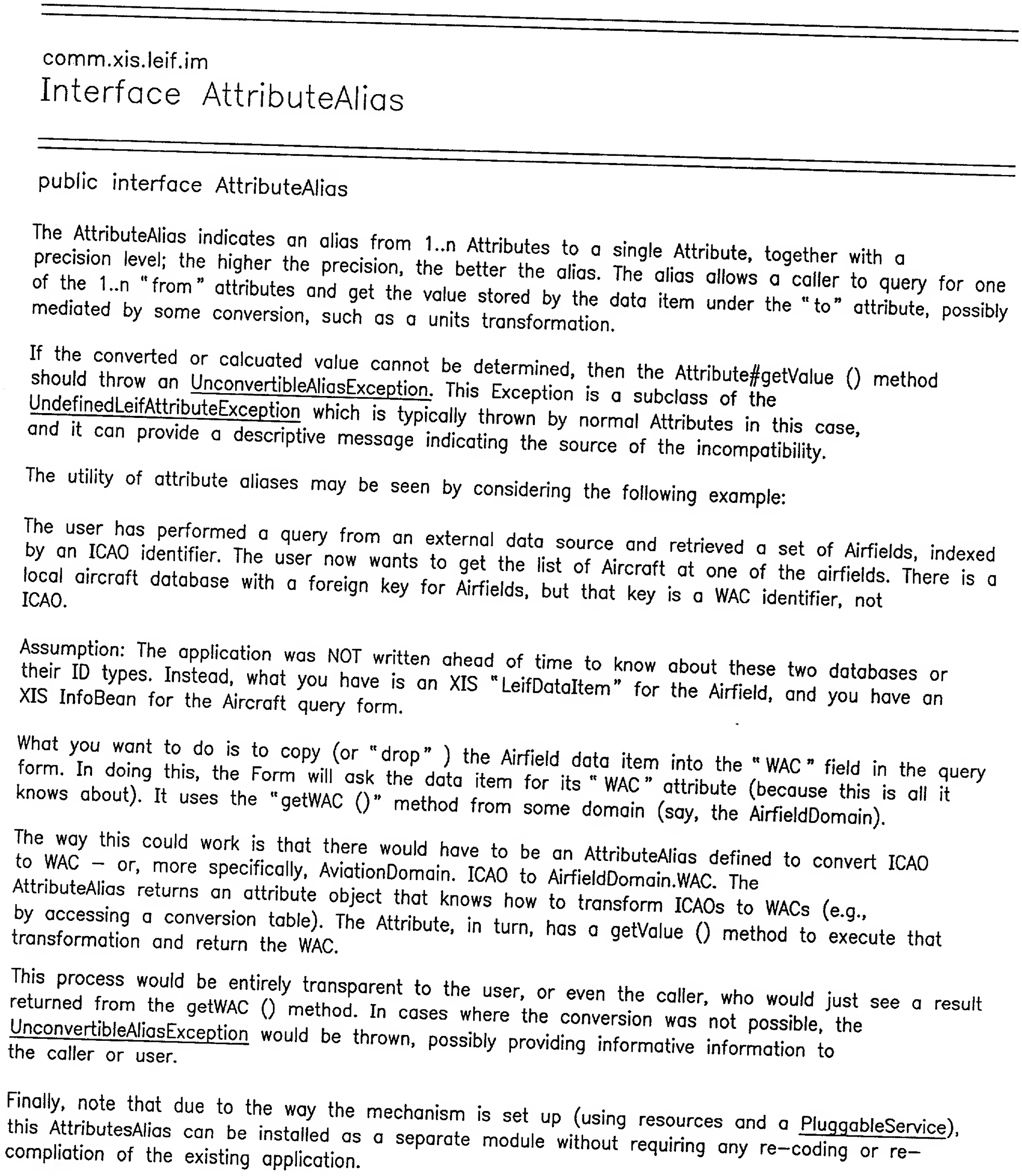


Preferred Attributes

| Property | Valve |
|---|---|
| Name | First HelloWorld Object |
| Speed (KTS) | 1 |
| Pen Color | □ |

FIG. 38D

FIG. 39A



comm.xis.leif.im

## Interface AttributeAlias

public interface AttributeAlias

The AttributeAlias indicates an alias from 1..n Attributes to a single Attribute, together with a precision level; the higher the precision, the better the alias. The alias allows a caller to query for one of the 1..n "from" attributes and get the value stored by the data item under the "to" attribute, possibly mediated by some conversion, such as a units transformation.

If the converted or calcuated value cannot be determined, then the Attribute#getValue () method should throw an UnconvertibleAliasException. This Exception is a subclass of the UndefinedLeifAttributeException which is typically thrown by normal Attributes in this case, and it can provide a descriptive message indicating the source of the incompatibility.

The utility of attribute aliases may be seen by considering the following example:

The user has performed a query from an external data source and retrieved a set of Airfields, indexed by an ICAO identifier. The user now wants to get the list of Aircraft at one of the airfields. There is a local aircraft database with a foreign key for Airfields, but that key is a WAC identifier, not ICAO.

Assumption: The application was NOT written ahead of time to know about these two databases or their ID types. Instead, what you have is an XIS "LeifDataItem" for the Airfield, and you have an XIS InfoBean for the Aircraft query form.

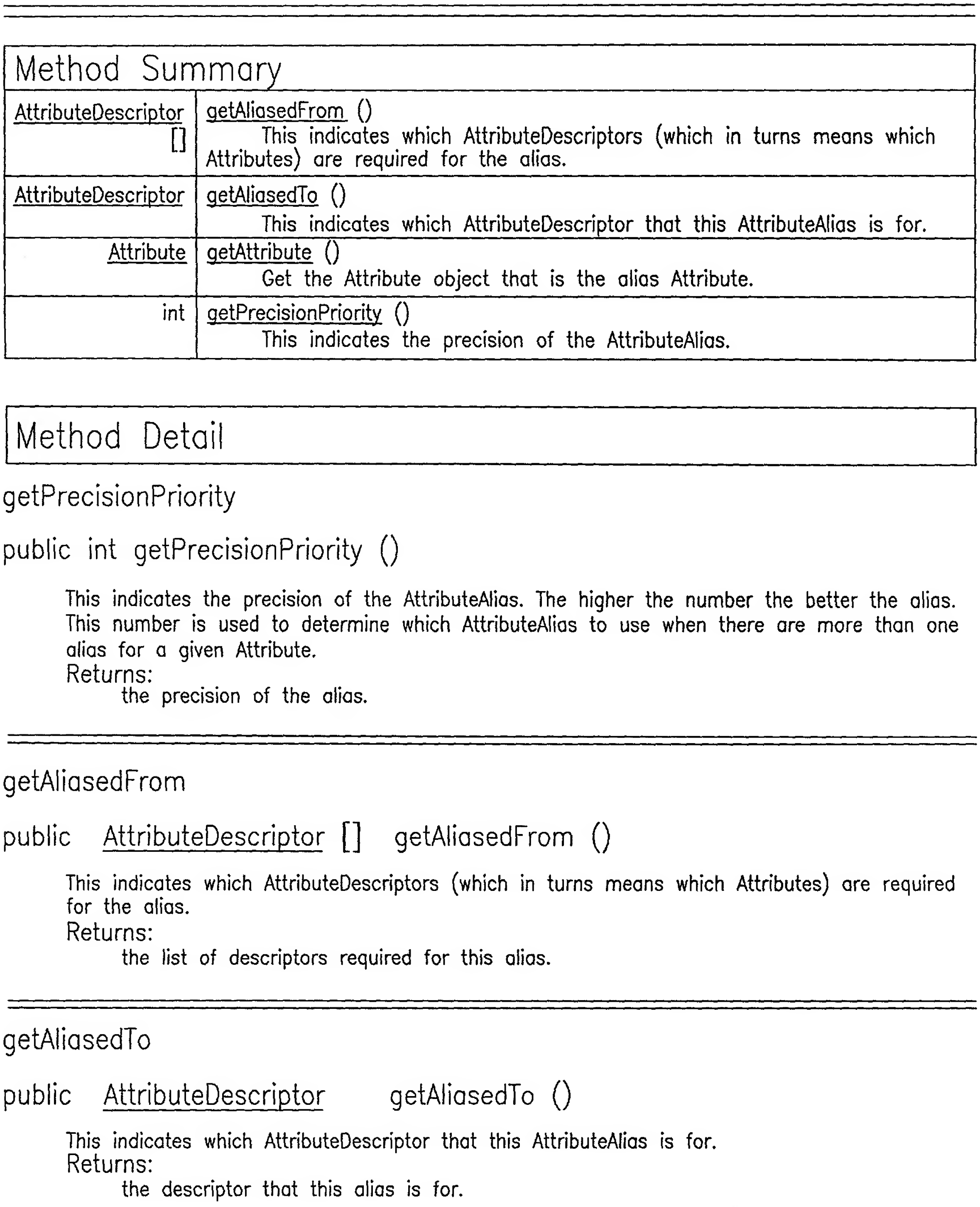
What you want to do is to copy (or "drop" ) the Airfield data item into the "WAC" field in the query form. In doing this, the Form will ask the data item for its "WAC" attribute (because this is all it knows about). It uses the "getWAC ()" method from some domain (say, the AirfieldDomain).

The way this could work is that there would have to be an AttributeAlias defined to convert ICAO to WAC – or, more specifically, AviationDomain. ICAO to AirfieldDomain.WAC. The AttributeAlias returns an attribute object that knows how to transform ICAOs to WACs (e.g., by accessing a conversion table). The Attribute, in turn, has a getValue () method to execute that transformation and return the WAC.

This process would be entirely transparent to the user, or even the caller, who would just see a result returned from the getWAC () method. In cases where the conversion was not possible, the UnconvertibleAliasException would be thrown, possibly providing informative information to the caller or user.

Finally, note that due to the way the mechanism is set up (using resources and a PluggableService), this AttributesAlias can be installed as a separate module without requiring any re-coding or re-compliation of the existing application.

FIG. 39B



| Method Summary | |
|---|---|
| AttributeDescriptor [] | getAliasedFrom ()<br>This indicates which AttributeDescriptors (which in turns means which Attributes) are required for the alias. |
| AttributeDescriptor | getAliasedTo ()<br>This indicates which AttributeDescriptor that this AttributeAlias is for. |
| Attribute | getAttribute ()<br>Get the Attribute object that is the alias Attribute. |
| int | getPrecisionPriority ()<br>This indicates the precision of the AttributeAlias. |

## Method Detail

### getPrecisionPriority

public int getPrecisionPriority ()

This indicates the precision of the AttributeAlias. The higher the number the better the alias. This number is used to determine which AttributeAlias to use when there are more than one alias for a given Attribute.

Returns:
the precision of the alias.

### getAliasedFrom

public AttributeDescriptor [] getAliasedFrom ()

This indicates which AttributeDescriptors (which in turns means which Attributes) are required for the alias.

Returns:
the list of descriptors required for this alias.

### getAliasedTo

public AttributeDescriptor getAliasedTo ()

This indicates which AttributeDescriptor that this AttributeAlias is for.

Returns:
the descriptor that this alias is for.

## getAttribute

public Attribute getAttribute()

Get the Attribute object that is the alias Attribute. This attribute is responsible for performing the translation from the aliased from Attributes. The AttributeDescriptor of the Attribute MUST be the same AttributeDescriptor returned by getAliasedTo.

Returns:

the attribute that will do the translation.

FIG. 39C

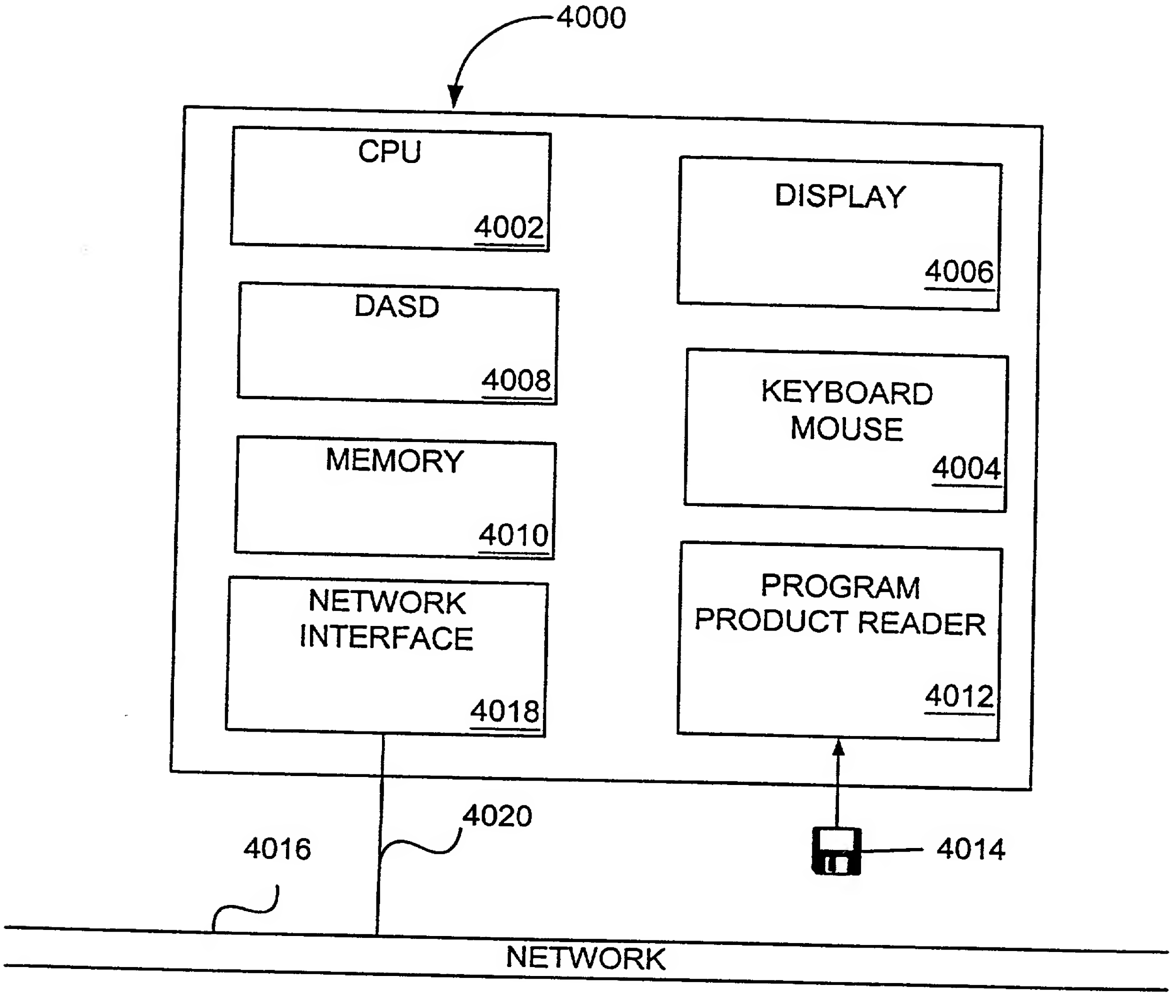

4000
CPU
4002
DISPLAY
4006
DASD
4008
KEYBOARD
MOUSE
4004
MEMORY
4010
NETWORK
INTERFACE
4018
PROGRAM
PRODUCT READER
4012
4020
4016
4014
NETWORK

FIG. 40